THE UNIVERSITY OF TEXAS AT AUSTIN Date: 9/7/2016

RECOMMENDATION FOR CHANGE IN ACADEMIC RANK/STATUS

Name: Saleh, Navid EID: salehnb Present Rank: Assistant Professor

Years of Academic Service ***(Include AY 2016-17 in each count)***:

At UT Austin since: 1/1/2014 (month/day/year) Total Years at UT Austin: 3.5

In Present Rank since: 1/1/2014 (month/day/year) Total Years in Present Rank: 3.5

Tenure-track only:
Number of Years in Probationary Status: 3

Additional information: Accelerated

Primary Department: Civil, Architectural, and Environmental Engineering

College/School: Engineering, Cockrell School of

Joint Department: N/A

College/School: N/A

Other Department(s): N/A

Recommendation actions[1]:

By Budget Council/Executive Committee: Promote

Vote[2] for promotion 26; Against 0; Abstain 1; Absent 7; Ineligible to vote 3

By Department Chair: Promote

By College/School Advisory Committee: Promote

Vote[2] for promotion 7; Against 0; Abstain 0; Absent 0; Ineligible to vote 0

By Dean: Promote

Administrative Action: Promote to Associate Professor

Date Action Effective: September 1, 2017
(To be submitted to the Board of Regents as part of the annual budget.)

By: Maurie McInnis For the President Date: December 15, 2016

[1] See "Chart of Recommended Actions" for eligible recommended actions applicable to specific conditions and administrative levels.
[2] Record all votes for and against promotion, abstentions by eligible voting members, and the number of absent eligible voting members. The number of committee members ineligible to vote should also be recorded. Enter zero where it would otherwise be blank.

EVPP/4.15

EXHIBIT
P's 153

Dean's Assessment
Navid B. Saleh
Department of Civil, Architectural, and Environmental Engineering
Cockrell School of Engineering

Dr. Navid Saleh received his BS in Civil Engineering from Bangladesh University of Engineering and Technology in 2001. He received his MS and PhD from Carnegie Mellon University in Civil and Environmental Engineering in 2004 and 2007, respectively. From June 2007 to December 2008 Navid Saleh was a postdoctoral associate at Yale University. Navid Saleh joined the faculty in the Department of Civil Engineering of the University of South Carolina (USC) in January 2009 and served there until December 2013. He subsequently joined the Department of Civil, Architectural, and Environmental Engineering at the University of Texas at Austin (UT) in January 2014.

If successfully promoted to associate professor in September 2017, he will have accumulated three years of probationary service at UT, and he will have served in rank as an assistant professor (at USC and UT) for a total of 7.5 years. While this case is considered to be an early promotion when considering only Dr. Saleh's time at UT, his total time in rank exceeds our normal timeline.

Eight external letters were submitted as part of the dossier, with four letter writers recommended by the candidate and four selected by the budget council. All letter writers are faculty members at universities in the US: Rice, Washington, Michigan, Virginia Tech, Yale, Stanford, Illinois, and UC Berkeley. Two letter writers are members of the National Academy of Engineering (NAE).

Teaching
Dr. Saleh's teaching has been in the area of environmental engineering. He has taught CE 341, *Introduction to Environmental Engineering*, a required undergraduate course for civil engineers three times with an average enrollment of 55; CE 377K, *Designing Sustainable Nanomaterials*, a technical elective for undergraduates once with an enrollment of 10; and CE 397, *Environmental Implications of Nanomaterials*, a graduate course twice with an average enrollment of 10.

Dr. Saleh's average instructor ratings at the undergraduate level have ranged between 4.1 and 4.8, with an average of 4.45. His average instructor rating is comparable to the average in the department for assistant professors teaching undergraduate courses (4.48) and considerably above the average in the Cockrell School (4.17). It is noted that Dr. Saleh's instructor ratings improved each time that he taught CE 341.

At the graduate level, his instructor ratings ranged from 3.9 to 4.7, with an average of 4.3. This is below the departmental average for assistant professors teaching graduate courses (4.43), but close to the Cockrell School average (4.34). Some concerns were expressed about the drop in instructor ratings during the second time that he taught CE 397. In the student comments, Dr. Saleh was asked to return solved homework and exams to the students in a timely manner and to slow the pace of his teaching.

Senior faculty conducted peer evaluations in his courses four times between 2014 and 2016. The comments from the peer reviewers were generally positive.

Research

Dr. Saleh's research addresses the beneficial uses of engineered nanomaterials and their possible consequences when released into the environment. Dr. Saleh's work, which is mostly experimental, has carefully addressed the aggregation and deposition of nanoparticles and nanotubes in water, mechanism of nano-bio interaction, nanotechnology based water treatment technology, and dispersion control in construction materials. Highlights of Dr. Saleh's published research include:

- 15 archival journal publications in rank at UT and 23 in rank at USC (career total of 50).
- 5 book chapters and one patent application at UT (one patent from USC)
- He frequently publishes in top-tier journals in his field, including *Environmental Science-Nano* (IF=5.90), *Water Research* (5.99), *Environmental Science and Technology* (5.39), *Journal of Hazardous Materials* (4.84), *Langmuir* (3.99), and *Nanotechnology* (3.57).
- An h-index of 23 (Google Scholar) with 4,213 citations. (Seven papers based on his PhD research at Carnegie Mellon correspond to more than 2,800 of the citations.)

While in rank at UT, Dr. Saleh secured nine grants from federal and state sources totaling $2.6 million in research funding (his share is approximately $0.8 million). Four grants are from the National Science Foundation (NSF), one is from the National Institutes of Health (NIH), and two are from the Environmental Protection Agency (EPA). He is the PI on six of these awards, and the PI for the subaward to UT on two.

At USC, he secured five grants from federal, state, and industrial sources totaling $1.33 million (his share is $0.67 million). Two grants are from NSF.

All the external letters strongly support Dr. Saleh's promotion and highlight the significance and creativity of his research.

Richard Luthy[1] (Stanford, NAE) states that Dr. Saleh "...continues to show a high rate of productivity and impact." He then points out that "Dr. Saleh is destined to make lasting contributions and shows excellent promise for the future." He notes the importance of Dr. Saleh's research by stressing that "... one example is his recent work on harnessing microwave radiation by absorption by metal oxide carbon nano-tube heterostructures to produce reactive oxygen species for disinfection. This is a highly original contribution with possibility for wide spread adoption in point-of-use treatment systems."

David Sedlak[2] (UC Berkeley, NAE) commented on Dr. Saleh's research on "...fundamental approach and experimental techniques to gain insight into the behavior of engineered nanomaterials" and noted that "... Saleh has contributed new insights into the role of aggregation and surface structure in experiments conducted in complex systems that contain nanomaterials." Dr. Sedlak concludes that "Saleh has established as strong reputation as one of the leading young researcher [sic] studying the aggregation and transport of environmental nanomaterials."

Benito Mariñas[3] (Illinois) states that he is "... impressed with the quality of Dr. Saleh's research. It is particularly impressive that with his civil and environmental engineering background he has been able to contribute meaningfully on the important topic of environmental and public health impact of nanoparticles."

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[1] Professor and former department chair, Department of Civil and Environmental Engineering
[2] Professor, Department of Civil and Environmental Engineering
[3] Head, Department of Civil and Environmental Engineering

Pedro Alvarez[4] (Rice) states, "Currently, Naved [sic] is broadly recognized as a leading expert on the environmental implications of carbon-based nanomaterials (e.g., single-walled carbon nanotubes) and nano-hybrids, including assessment of their fate, transport and potential toxicity."

Jaehong Kim[5] (Yale) stresses that "... Navid is one of emerging stars who can be tenured at any research-intensive institutions."

Advising and Student Mentoring

Dr. Saleh has graduated two PhD students and two MS students (one co-supervised) at UT. Both of the PhD students started their graduate studies at USC, and moved to UT with Dr. Saleh. One of those students is now an assistant professor at SUNY Buffalo, and the other is a post-doc at Stanford. He has also supervised four undergraduate students.

At USC, Dr. Saleh graduated one PhD student and three MS students (one co-supervised). The PhD student is currently a post-doc at Rhode Island. He also supervised four undergraduate students.

Currently, Dr. Saleh is supervising four PhD students (one co-supervised) and three MS students (one co-supervised). In addition, he is very active with undergraduate student participation in laboratory work.

University Service

Dr. Saleh has served on several departmental committees, including the Strategic Vision Implementation Committee.

Professional Service

Dr. Saleh serves on the editorial board of *Environmental Science: Nano*, which is published by the Royal Society of Chemistry. He is an active member of the American Chemical Society (ACS). In 2016, he was the co-organizer and co-chair of three symposia: "Nanotechnology for Sustainable Agriculture and Food Systems," "Environmental Applications and Implications of Active Nanomaterials, Hierarchical Nanostructures, and Nanohybrids," and "Colloidal and Interfacial Phenomena in Environmental Systems."

Dr. Saleh has actively engaged in outreach to colleges and universities within the Navajo Nation, to develop means of providing safe water supplies.

Other Evidence of Merit or Recognition

In 2015, Dr. Saleh's research was recognized with one of two Emerging Investigator Awards from *Environmental Science: Nano* and the Sustainable Nanotechnology Organization. He serves on the editorial board of *Environmental Science: Nano* (IF=5.90). His students have also received awards for best paper and best poster at national conferences.

Overall Assessment

In summary, Dr. Saleh is a very good teacher and an excellent researcher whose contributions in the field of environmental effects of nanomaterials have been of the highest caliber. His publication and funding records are very strong. He has graduated two PhD students at UT and one at USC, and is currently supervising a large research group. He is very active and visible in the environmental nanomaterial community, and his work has been recognized with an international award. All

[4] Professor and former department chair, Department of Civil and Environmental Engineering
[5] Professor, Chemical and Environmental Engineering

evidence indicates that he has successfully made the transition from USC to UT, and that his productivity is accelerating.

Overall, I believe that Dr. Saleh meets or exceeds expectations for promotion to associate professor with tenure in all areas, and I support his case without reservation.

Sharon L. Wood, Dean
19 October 2016

Department of Civil, Architectural and Environmental Engineering
Statement by Department Chair

Candidate: **Navid Saleh**

Navid joined the faculty of the Department of Civil, Architectural and Environmental Engineering (CAEE) in January of 2014 and has been in rank as assistant professor since that time. Prior to assuming a position in CAEE at UT, Navid was an assistant professor at the University of South Carolina for five years. As such, he will have been at the rank of assistant professor for eight years at the end of the fall 2016 semester. He was also a post-doctoral fellow at Yale University for 18 months prior to his first academic position at the University of South Carolina. His general area of expertise is on applications and environmental consequences of engineered nanomaterials, largely but not entirely focused on aquatic environments.

My assessment of Navid is based on a detailed analysis of (1) his curriculum vitae and statements, (2) Budget Council statements, (3) letters from external reviewers, (4) CIS evaluations for all courses taught in rank, (5) written student comments for courses taught in rank, (6) peer teaching evaluations completed during current academic rank, (7) publications and citations, and (8) Budget Council discussions and vote on whether Navid should be promoted.

The remainder of this Chair's statement includes a discussion of the Budget Council vote on Navid's case, and Navid's performance in teaching, research (sponsorship, supervision, scholarly accomplishments), other academic advising, administrative and committee service (at UT and in profession), as well as honors and recognition. Selective comments made by external reviewers are added to this statement as reinforcement of my own assessment or to highlight when my assessment diverges from a reviewer and why that might be the case. My recommendation on Navid's promotion case is provided at the end of this statement.

Budget Council Discussion and Vote

The Budget Council vote was strongly in support of Navid's promotion to associate professor **(**Overall recommendation: **26 Yes, 0 No, 1 Abstain).**

The discussion by the Budget Council following the presentation of Navid's case was entirely positive. One Budget Council member (not in Navid's area) commented that Navid's recent work on microwave disinfection of water was potentially transformative for the under-developed world. Another said that students find him to be "extremely caring." Another referred to Navid as the "Energizer Bunny" because he seems to have an endless supply of energy. One member in Navid's area said that she reviewed Navid's unsuccessful NSF CAREER proposal and was shocked that it was not funded, that it was "spectacular" and that it was clear that reviewers did not understand it, to the point of not understanding unit conversions.

The one Budget Council member who voted "abstain" simply objected to someone going up early even if his record is strong. He or she felt that Navid needs more time at UT before being considered for promotion. That same person acknowledged, however, that Navid is building a strong record.

Teaching

Assistant professors in CAEE are generally required to teach three courses per year, except in their first year during which they teach two courses; one recent hire at the assistant professor level negotiated two years of teaching 2 courses/yr. As such, the "norm" for assistant professors is to teach 14 courses by the

time they submit their promotion package after five years in rank. There are exceptions to this norm, often involving more than 14 courses. For example, if a new faculty member starts in the spring semester and then completes five full years starting the next fall before submitting a promotion package they will have taught 15 or 16 courses. If a faculty member has one semester of modified instructional duties and stops the "tenure clock" he or she will still have taught one semester that year, and so will generally have 15 or 16 courses at time of review for promotion and tenure. As Chair, I generally discourage assistant professors from buying out courses. It is possible that an assistant professor has less than 14 courses at the time of promotion and tenure review if one of their courses, usually a graduate course, is canceled for insufficient enrollment.

Navid has been in rank as an assistant professor for five semesters at UT following five full years at the University of South Carolina. In such a case an assistant professor is usually asked to teach one course in the spring semester, two in their first complete year, and then three from the second full year onward, i.e., six course offerings total. This is the case for Navid.

Navid has taught 3 unique courses to 6 classes totaling 194 students in five semesters at UT. He has taught CE341 – *Introduction to Environmental Engineering* three times to 165 students (85% of his total in-class student contact hours). This 3rd-year course is required of all undergraduate civil engineering students and is an elective course for architectural engineering students. The average enrollment has been 55 students in Navid's three offerings of this course. The course covers a wide range of fundamental principles and applications relevant to environmental engineering. Navid has also taught CE377K – *Designing Sustainable Nanomaterials* once to 10 students, and a graduate course entitled CE397 – *Environmental Implications of Nanomaterials* twice to 11 and 8 students. Navid's overall instructor and course ratings by students across all courses has been 4.40 and 4.07, respectively. His overall instructor rating is greater than the Cockrell School of Engineering five-year average of 4.23 for assistant professors and slightly below the five-year average for assistant professors in CAEE of 4.46. The CAEE average is by far the highest in the Cockrell School of Engineering, and Navid's ratings are well above the assistant professor averages in five of the other six departments in the CSE, and slightly above the sixth. As additional context, Navid's mean overall instructor rating falls within the range of those for the five most recent assistant professors in CAEE who were successfully promoted to associate professor (range = 4.02 to 4.71), with a nearly identical mean (mean = 4.39 for the five most recently promoted assistant professors).

Navid's mean student evaluations for instructor and course in his four undergraduate offerings have been 4.45 and 4.05, respectively. His instructor rating in these courses is well-above the five-year average for assistant professors in undergraduate courses in the CSE and every department in CSE except for CAEE (4.48). Importantly, Navid's student evaluations have improved each time that he has taught CE341 (Instructor/course evaluations of 4.1/3.8, 4.3/3.9, and 4.8/4.4 in successive spring semesters starting in 2014). This is likely attributed to Navid's own self-assessment of student evaluations and comments related to the fact that he often speaks too fast for students to keep up in lecture. He has made a concerted effort to improve in this respect.

Navid's mean instructor and course evaluation in his two graduate course offerings have been 4.30 and 4.10, respectively. His mean instructor rating is slightly below the CSE five-year average for assistant professors in graduate courses (4.34) and below the CAEE average of 4.43. However, the sample size (two classes of 19 total students) is relatively small. I note that unlike in CE341, Navid's course and instructor evaluations declined from the first to second offering (I/C = 4.7/4.3 to 3.9/3.9). The second offering occurred in fall 2015, the first semester in which Navid taught two classes in the same semester; the second course was CE377K, for which he received instructor and course evaluations of 4.6 and 4.1, respectively, from 10 undergraduate students.

I reviewed CIS summaries and student comments for all of Navid's course offerings at UT, with particular attention paid to his improvement in CE341 and decline in CE397. During his first offering of CE341 students gave him an average rating of only 3.6 on "Assignments and tests returned promptly" and some students were critical of this in their comments. The most frequent criticism was that Navid speaks too fast or that sometimes he rushes through the material. There were a lot of other good suggestions for improvement and positive comments about Navid as an instructor and about the course. In his second offering there continued to be comments about Navid speaking too fast. However, the positive comments seemed to increase, particularly about Navid as a teacher (passionate, fun, enthusiastic, great). By the third offering there were very few criticisms and a significant number of superlatives written about Navid as a teacher and person.

Navid received many positive comments in his first offering of CE397. Consistent with his earlier offerings of CE341, the primary criticism seemed to be the fast pace, coupled with a significant amount of sometimes heavy information. In the second offering Navid received student evaluations of less than 4.0 for communication of material effectively (3.8) and for the course organization (3.9). Some students wanted more homework assignments and/or more reading material. There were very specific criticisms regrading time spent on individual topics. Nevertheless, there were also positive comments about Navid as an instructor and about how much students learned.

Navid has received peer reviews of in-classroom teaching on four different occasions by senior faculty members in CAEE. All four were in undergraduate courses (3 for CE341). All four reviews were positive and paint a picture of a good, enthusiastic and energetic instructor. Two peer reviewers commented on the fast pace of Navid's lecture or that he did not have enough time for detailed explanations during the lecture period. These observations are consistent with those expressed by students in their evaluations.

Navid is a good teacher and has potential to continue to improve. He certainly meets the teaching expectations of an assistant professor in CAEE.

External Reviewers

In selecting external reviewers the CAEE aims for individuals who are internationally-recognized in a field that overlaps as much as possible with the promotion candidate under consideration. Our goal is to select reviewers from peer institutions, approximately defined as being from top 20 colleges of engineering and/or top 20 programs of relevance to the candidate's field, e.g., civil engineering or environmental engineering. If possible, we try to obtain a letter from at least one member of the National Academy of Engineering. We attempt to avoid letters from two scholars from the same university. We also attempt to avoid having a large fraction of reviewers from private universities, which operate under different constraints than those of large public universities. This is what we aim for and often come at least very close to meeting. In narrow fields of study it is often difficult to find eight individuals to write letters given the intersection of constraints listed above.

External reviewers of Navid's promotion package included: Pedro Alvarez (Department of Civil and Environmental Engineering, Rice University), Mark Benjamin (Department of Civil and Environmental Engineering, University of Washington), Kim Hayes (Chair, Department of Civil and Environmental Engineering, University of Michigan), Michael Hochella Jr. (Department of Geosciences, Virginia Tech), Jaehong Kim (Department of Chemical and Environmental Engineering, Yale University), Richard Luthy Department of Civil and Environmental Engineering, Stanford University), Benito Mariñas (Head, Department of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign), and David Sedlak (Department of Civil and Environmental Engineering, UC Berkeley). Reviewers are listed simply by *last name* throughout the remainder of this statement.

Of the environmental engineering programs represented amongst the external reviewers for Navid, UC Berkeley, University of Illinois at Urbana-Champaign, and the University of Michigan are our closest peers amongst public universities in the United States. In addition to these three programs, Stanford's environmental engineering graduate program is generally acknowledged and ranked as one of the two best in the U.S. by U.S. News and World Report. Other programs represented by external reviewers are also strong in environmental engineering and science.

I note that two of the external reviewers for Navid are departmental administrators, Hayes (Chair) and Mariñas (Head). Both Richard Luthy and David Sedlak are members of the prestigious National Academy of Engineering.

Research

Navid is a highly productive and creative force in the rapidly expanding area of environmental consequences and beneficial uses of engineered nanomaterials. He is an experimentalist, and his team studies the physical aspects of engineered nanomaterials, e.g., aggregation and deposition of carbon nanotubes, principally in water. Applications of his research include an improved understanding of the fate of engineered nanomaterials in the environment, nano-bio implications, and cutting-edge nano-enabled technologies for water treatment, including in underserved communities. His stature in these areas is growing, but already significant, as described by several of his external reviewers:

"Currently, Naved is broadly recognized as a leading expert on the environmental engineering implications of carbon-based nanomaterials (e.g., single-walled carbon nanotubes) and nano-hybrids, including assessment of their fate, transport and potential toxicity." (Alvarez)

"By almost any quantitative measure, the body of work compiled by Dr. Saleh is impressive in an absolute sense and in comparison to others from highly-regarded research-intensive institutions at a similar career stage. (Hayes)

"I'd put Navid in the top quarter of the people in his field at top research university. From my view, on the outside looking in, any school that has Navid on their faculty, at least from a research point of view, is fortunate, really fortunate." (Hochella)

"Dr. Saleh is among the foremost thought leaders on these emerging issues [several noted]." (Luthy)

"I believe that he compares very favorably with other investigators at this stage at highly-ranked research-intensive universities." (Luthy)

"Dr. Navid Saleh has established a strong reputation as one of the leading young researcher studying the aggregation and transport of environmental nanomaterials." (Sedlak).

"Please understand that I am known at Virginia Tech as being one of the toughest assessors of faculty going up for tenure. I am not afraid to vote "no" in P&T decisions …… Given such an introduction, I can say that this is an easy letter for me to write. I believe that this is a straight-forward case, at least from a research point-of-view." And, "Let me conclude by saying that if Navid was up for tenure in Virginia Tech's Department of Civil and Environmental Engineering at Virginia Tech, as a top-10 graduate department, he would definitely get tenure. If he was at Stanford, another top-10 graduate department, he would also receive tenure." (Hochella) [Hochella was at Stanford for 13 years earlier in his career].

"In fact, Navid is one of emerging stars who can be tenured at any research intensive institutions." (Kim)

"Based on my experience in the CEE P&T process, in the past as member/chair of the P&T and ad-hoc committees and more recently as department head, I believe that Dr. Saleh would be successfully promoted if we were evaluating him at Illinois." (Mariñas)

Research Sponsorship: Navid has proven that he can develop an independent and productive research program by actively seeking and securing research sponsorship. He did so at the University of South Carolina and has expanded his efforts since joining UT. Those efforts have led to 8 funded research grants secured on which Navid serves as PI or Co-PI since joining the faculty of UT; he serves as PI on 7 of these grants and sole-PI on 3 grants. Navid's grants since joining UT total just under $2.6 million, of which just over $805 thousand is his share. When normalized by years in rank, Navid's share of research funding ranks below two and above three of the five most recent assistant professors who were promoted to associate professor in CAEE.

Navid has received funding in the highly competitive worlds of the National Science Foundation (NSF) and the National Institute of Health (NIH). He is PI on four grants from the NSF and one from NIH that collectively total 74% of his share of research funding. He is also PI on a project funded by the Texas Department of Transportation and a small project funded by the Texas Hazardous Waste Research Center. His is Co-PI (with four other Co-PIs) on a large project from the United States Environmental Protection Agency that makes up 56% of his total research funding, but only 12% of his share of funding.
That Navid serves as PI on so many projects while having been at UT for only 33 months is impressive and far exceeds the expectations of an assistant professor. His ability to attract most of his share of research funding from two highly competitive federal agencies (NSF and NIH) is even more impressive.

Several external reviewers commented on Navid's promise for future research:

"...his scholarly achievements to date have already brought him significant recognition and acclaim, and he has the research program and infrastructure in place to magnify his impact even more in the foreseeable future." (Hayes)

"Who knows, but I think the range of possibilities goes from, at worst, a super solid and admired contributor with a very special and long career, to at best, the national Academy of Engineering. It will be somewhere in that range, I think guaranteed." (Hochella)

"Dr. Saleh is destined to make lasting contributions and shows excellent promise for the future." (Luthy)

Scholarly Contributions: Navid and his students have published their research findings in top journals in their field. He has published a total of 50 journal papers (15 in rank at UT) and 48 peer-reviewed conference proceedings (20 in rank at UT). Navid's career citations total 4,213 (Google Scholar), with an h-index of 23 (Google Scholar). For comparison, I reviewed citations and h-indices for the five most recent CAEE faculty members who were promoted to associate professor. Of these, three had served as assistant professor for five years at the time my data were derived, one had served for six years, including two at another university, and one had served for eight years, including six at another university. Of this cohort the total number of citations ranged from 92 to 660, with h-indices ranging from 6 to 12. The faculty member who had served at a university comparable to the University of South Carolina (University of Arkansas) for six years had 274 citations (15 x lower than Navid's citation count) and an h-index of 9. I understand that publication and citation counts differ significantly between fields, and even sub-disciplines within the same field, but that Navid's totals are so far above his recent successful predecessors is important to note. In fact, his citation count is more than a factor of two greater than the highest citation count, and his h-index greater, than the highest amongst our four most recent *associate to full promotion cases*.

External reviewers commented not only on Navid's significant publication record, but also on the quality of journals in which his papers are being published:

> "With approximately 50 publications in press or under review, most in top-notch journals, and an H-factor of 23, he is far over the bar for promotion with respect to research output." (Benjamin)
>
> "Professor Saleh's publication record is unimpeachably strong." (Benjamin)
>
> Also, the quality of journals he has selected to publish his work are generally quite strong, with many of his publications appearing in premiere journals of his field …" (Hayes)
>
> "He has 11 papers that have been cited more than 100 times; that's even better than my own citation record." (Kim)
>
> "His research is first-rate and his publications are presented in the most important journals in our field…." (Luthy)
>
> "He is publishing with his students and collaorators in highly recognized journals …" (Mariñas)
>
> "Over half of Saleh's papers were published in the most prestigious journal in the field (Environmental Science & Technology)" (Sedlak)
>
> "Relative to his peers (i.e., Assistant Professors in environmental engineering) this is a very strong publication record." (Sedlak)

Navid has also co-authored five book chapters, three as first author, since joining the faculty of UT. During that same time he has delivered 7 invited seminars at other universities, including Cornell, U of Illinois at Urbana-Champaign, Rice University, Temple University, U of Florida, Manhattan College, and the U of New Orleans. He has also been invited to speak at Stanford University in the near future.

I hesitate to call Navid a rising star in his field, as that would imply that he is not already a star. In either case, by several metrics he is highly-recognized in his field, is doing high quality research that is being published in the best journals in his field. He has a trajectory toward a highly sustainable and productive future as a researcher that far exceeds the norm in CAEE.

Advising

Research Supervision: Prior to joining the faculty of UT, Navid sole-supervised 1 Ph.D. student and 2 M.S. students to completion, with a third co-supervised M.S. student who graduated at the University of South Carolina. While at UT Navid has sole-supervised 2 Ph.D. students to completion; both were students who followed Navid from the University of South Carolina to UT. One of those students is now an assistant professor at SUNY Buffalo and the other is a post-doc at Stanford University. Navid has also graduated 1 sole-supervised and 1 co-supervised M.S. student while at UT. Navid currently has 3 sole-supervised and one co-supervised Ph.D. students in the pipeline and 2 sole-supervised and 1 co-supervised M.S. students in progress. At least one of these M.S. students appears to have joined his team in September 2016.

As described in detail in his Advising statement, Navid actively involves his students in the design of publications and also in pedagogical activities for Ph.D. students. One reviewer noted positively that Navid's graduate students are co-authors on almost every one of his papers since he has become a professor:

"He has also published nearly all of his work, both at the University of South Carolina (21 out of 23) and University of Texas at Austin (13 out of 14), with his students as co-authors, indicating his advisees are contributing to nearly all of the published work." (Hayes)

In addition to the graduate student supervision described above, Navid has served as research supervisor of 4 undergraduate students at UT; he also supervised 4 undergraduate students while at the University of South Carolina. Importantly, he works to excite these students about research by assuring that they work not only on the specific efforts of graduate students, but also on their own independent projects. One of his undergraduate advisees at the University of South Carolina followed him to UT and wrote a successful application for an NSF Graduate Fellowship.

As with most faculty members in CAEE, Navid also engages in undergraduate student advising for course selection each fall and spring semester.

I consider Navid's level of academic advising to meet the expectations of an assistant professor in CAEE. His efforts to date have clearly focused on advising related to research, for which he has exceled.

Administrative and Committee Service

Departmental: I became the Chair of CAEE shortly after leading an effort to develop a new strategic vision and plan. Knowing that strategic plans often become strategically placed in file cabinets never to be seen again, I decided to form a new committee named the Strategic Vision Implementation Committee (SVIC). I appointed primarily assistant and a few associate professors to the SVIC, as they were clearly the most excited about our new vision. One of those assistant professors was Navid. He has been an active member of the SVIC for two years and has derived numerous suggestions for advancement of the vision and department. I intend to act on some of these in the next year. One of Navid's major recommendations is a concept that he calls the "Meeting of the Minds" that will allow both faculty and students to present posters on research and engineering practice. Navid is also working with a CAEE colleague to organize a workshop to catalyze dialogue among experts involved with nano-environmental and engineering ethics, with the goal of integrating related topics into engineering curricula.

Other UT: To date, Navid has not engaged in significant service to the Cockrell School of Engineering or UT. He did serve as a marshal in the University-wide commencement ceremony in spring of 2016. He is also funded by the Gulf Coast Hazardous Waste Research Center to develop environmental health and safety (EHS) protocols for safe handling of disposal of laboratory materials. In the process he has solicited input from the EHS office at UT and hopes that his recommendations will ultimately be implemented at UT and elsewhere. If this happens, Navid will have made a major contribution to related research activities across campus.

Navid's service to CAEE and UT has been at the lower end of what is typical of assistant professors in CAEE, but still meets expectations based on a general approach within CAEE of minimizing required service by assistant professors.

Profession: Navid has been an active member of three professional societies, the American Chemical Society (ACS), Association of Environmental Engineering and Science Professors (AEESP), and the Sustainable Nano Organization (Sus Nano). He has been involved in the organization of conference sessions for several ACS and Sus Nano meetings. Navid has served on three NSF proposal review panels and actively reviews papers for 20 high impact journals.

Community: Navid has developed close relationships with San Juan College (SJC) and the Navajo Technical University (NTU), two institutions within the Navajo Nation in New Mexico, where he has worked to develop and employ point-of-use water treatment using nanomaterials. He hopes to continue research with these institutions through 2018 and to present up to three lectures electronically at NTU each semester.

Navid clearly meets expectations in terms of his service to profession and community.

In general, Navid's service is highly focused on aspects of his research and expertise. This clearly underscores his passion for research and its integration into various aspects of the university, profession and community.

Honors and Recognition

Navid's publication record in high quality journals, his high level of citations and h-index, and his ability to secure research grants in the highly-competitive NSF space are direct reflections of the significant recognition that he is receiving in his field. His most significant award to date was the 2015 Emerging Investigator Award given by the Sustainable Nanotechnology Organization and the Royal Society of Chemistry's journal *Environmental Science: Nano*. This is a prestigious award in Navid's field. In his personal statement Navid cites Vicki Grassian, an internationally-recognized surface chemist at UC San Diego and the editor of *Environmental Science: Nano*, who said, "Professor Saleh was selected because of his pioneering research contributions and his commitment to educating and engaging students in the field of sustainable nanotechnology." I met Vicki Grassian about a year ago at a Sloan Foundation event. Shortly after meeting her she mentioned knowing Navid and preceded to explain what a great researcher he is and how much she has enjoyed interacting with him.

One reviewer, David Sedlak, commented that, "The one possible deficiency in his record relative to the very top members of his cohort is the absence of significantly young investigator awards (e.g., NSF CAREER), best paper awards or high-profile keynote talks." Sedlak is correct in stating that Navid did not receive an NSF CAREER grant. However, as described above, Navid has otherwise been very successful competing for federal research sponsorship, particularly with NSF. He has received an emerging investigator award as described above, and his undergraduate and graduate students have also received several awards during his tenure at the University of South Carolina and UT.

Summary

Navid is a good teacher. However, I consider his research efforts and scholarly contributions to be his greatest strength to date. His productivity and the quality of his work are unquestionably exceptional and exceed expectations for an assistant professor in CAEE. It is difficult to see anything but a very bright future for Navid.

If I have any concern about Navid it is his pace. Anyone who knows him is impressed by his seemingly endless supply of energy and drive (see Budget Council "Energizer Bunny" comment). I have counseled him on several occasions to pace himself and to remember that while career is important, it is just one part of life. Navid has said that he appreciates these discussions, but they do not appear to have made a difference.

In my opinion, Navid is highly deserving of promotion to associate professor and I endorse his case for promotion without qualification.

Richard L. Corsi, Ph.D., P.E.
Department Chair and Joe J. King Chair in Engineering #2
22 September 2016

Navid Saleh was scheduled to undergo third year review in 2016-17.

THE UNIVERSITY OF TEXAS
Cockrell School of Engineering
Standard Resume

FULL NAME: Navid B. Saleh **TITLE:** Assistant Professor

DEPARTMENT: Civil, Architectural, and Environmental Engineering

EDUCATION:

Bangladesh University of Engineering and Technology	Civil Engineering	B.S.	2001
Carnegie Mellon University	Civil and Environmental Engineering	M.S.	2004
Carnegie Mellon University	Civil and Environmental Engineering	Ph.D.	2007

CURRENT AND PREVIOUS ACADEMIC POSITIONS:

University of South Carolina	Assistant Professor	Jan 2009-Dec 2013
University of Texas at Austin	Assistant Professor	Jan 2014-present

OTHER PROFESSIONAL EXPERIENCE:

Yale University	Postdoctoral Associate	Jun 2007-Dec 2008

HONORS AND AWARDS:

Emerging Investigator Award, 2015, awarded by the Royal Society of Chemistry and Sustainable Nanotechnology Organization; November 08, 2015, Portland, OR.

Honorable Mention for Poster Presentation, 1st Sustainable Nanotechnology Conference, Nov, 2012

Explicitly profiled in USC College of Engineering Brochure for Outstanding Research Performance, Oct, 2009

Best Poster Award, Gordon Research Conference, Environmental Sciences: Water, 2008.

Outstanding Teaching Assistant Award, Carnegie Mellon University, Pittsburgh, PA, 2007.

Quantitative Environmental Analysis (QEA), LLC Graduate Scholarship 2006-2007.

ACS Environmental Chemistry Graduate Student Award, 2006.

ACS 'Environmental Interfaces' Travel Grant Award, 2006.

Sigma XI Grant in Aid of Research Award 2005-2006.

Air & Waste Management Association (A&WMA) Award, 2005-2006.

MEMBERSHIPS IN PROFESSIONAL AND HONORARY SOCIETIES:

American Chemical Association
American Society for Engineering Education
Association of Environmental Engineering and Science Professors
Sustainable Nanotechnology Organization

UNIVERSITY COMMITTEE ASSIGNMENTS:

Member, Strategic Vision Implementation Committee, CAEE, UT Austin, Fall 2014-present
Member, Distinguished Lecturer Committee, CAEE, UT Austin, Fall 2015-present
Member, EWRE Seminar Organization Committee, Fall 2015-present

PROFESSIONAL SOCIETY AND MAJOR GOVERNMENTAL COMMITTEES:

Editorial Board

Editorial Advisory Board Member, Environmental Science: Nano, A Royal Society of Chemistry Journal with impact factor 5.896.

Journal Reviewer

American Chemical Society Applied Materials and Interfaces, American Chemical Society Nano, American Chemical Society Sustainable Chemistry and Engineering, Bioorganic and Medicinal Chemistry Letters, Carbon, Chemical Engineering Journal, Chemosphere, Civil Engineering Infrastructure Journal, Critical Reviews in Environmental Science and Technology, Environmental Earth Sciences, Environmental Pollution, Environmental Sciences: Nano, Environmental Science and Pollution Research, Environmental Science and Technology, Industrial and Engineering Chemistry Research, Journal of American Chemical Society, Journal of Colloid and Interface Sciences, Journal of Contaminant Hydrology, Journal of Environmental Toxicology and Chemistry, Journal of Nanomedicine, Journal of Physical Chemistry, Nanotoxicology, Particulate Science and Technology, Water Research.

Research Proposal Reviewer

National Science Foundation, 2011-2013, 2016

COMMUNITY ACTIVITIES:
Conference/Workshop Chair/Co-Chair

University of Texas:

Co-organizer of a pedagogical workshop titled: A workshop on nano education: Integration of social and ethical implications via problem based learning, Fall 2016, University of Texas at Austin.

Co-Chair (Principal Organizer), 252nd ACS National Meeting, Philadelphia, PA, August 21-25, 2016, "Nanotechnology for Sustainable Agriculture and Food Systems".

Co-Chair (Principal Organizer), 8th International Nanotoxicological Congress, Boston, MA, June 1-4, 2016, "Environmental Applications and Implications of Active Nanomaterials, Hierarchical Nanostructures, and Nanohybrids".

Co-Chair, 90th ACS Colloid and Surface Science Symposium, Harvard University, Cambridge, MA, June 5-8, 2016, "Colloidal and Interfacial Phenomena in Environmental Systems".

Co-Chair, 249th ACS National Meeting, Denver, CO, March 22-26, 2015, "Dispersion of nanoparticles and its implications for interfacial, biological, and environmental processes: Sorption and dispersion".

Chair, Fate and Transport of Nanomaterials Session, 3rd Annual Meeting of Sustainable Nanotechnology Organization (SNO), Boston, MA, November 02-04, 2014.

Attendee (invited), Research workshop on NanoEHS: Fundamental Science Needs, 3rd Annual Meeting of Sustainable Nanotechnology Organization (SNO), Boston, MA, November 01, 2014.

University of South Carolina:

Chair and Chief Organizer, NUE: Workshop on Problem-Based Learning for Nanotechnology, Columbia, SC, August 19-20, 2013.

Chair, Functional Nanomaterials for Trace Contaminant Detection, Removal, and Monitoring, 12th International Conference on the Biogeochemistry of Trace Elements, Athens, Georgia, June 16 – 20, 2013

Chair, Nanomaterials Interaction at Biological Interfaces, Division of Environmental Chemistry, American Chemical Society (ACS) Annual Meeting, San Diego, CA, March 25-29, 2012.

Chair, Role of Physicochemical Properties in Nanotoxicology, Environmental Effects of Nanoparticles and Nanomaterials, SETAC-Clemson University, Aug 22-26, 2010, Clemson, SC.

Graduate and Postdoctoral Training:

Chair, Colloidal and Interfacial Phenomena in Aquatic Systems (09019), Environmental Division, American Institute of Chemical Engineers (AIChE) Annual Meeting, Philadelphia, PA, November 16-21, 2008.

PUBLICATIONS:

A. Refereed Archival Journal Publications (in print or accepted, 50)

Underlining indicates supervised student(s)

University of Texas:

UT-1. Bisesi Jr., J. H., Merten, J., Liu, K., Parks, A. N., Afrooz, A. R. M. N., Glenn, J. B., Klaine, S. J., Kane, A. S., Saleh, N. B., Ferguson, P. L., Sabo-Attwood, T. (January, 2014). Tracking and Quantificaiton of Single-Walled Carbon Nanotubes in Fish Using Near Infra Red Fluorescence. *Environmental Science & Technology. 48 (3)*, 1973-1983. DOI: 10.1021/es4046023.

UT-2. Aich, N., Kim, E., ElBatanouny, M., Plazas-Tuttle, J., Yang, J., Ziehl, P., Saleh, N. B. (May, 2014). Detection of Crack Formation and Stress Distribution on Carbon Fiber Reinforced Polymer Specimens Through Triboluminescent-Based Imaging. *Journal of Intelligent Material Systems and Structures*. 1-8. DOI: 10.1177/1045389X14535017.

UT-3. Saleh, N. B., Afrooz, A. R. M. N., Bisesi Jr., J. H., Aich, N., Plazas-Tuttle, J., Sabo-Attwood, T. (June, 2014). Emergent Properties and Toxicological Considerations for Nanohybrid Materials in Aquatic Systems. *Nanomaterials. 4*, 372-407. DOI: 10.3390/nano4020372.

UT-4. Aich, N., Plazas-Tuttle, J., Lead, J. R., Saleh, N. B. (December, 2014). A Critical Review of Nanohybrids: Synthesis, Applications and Environmental Implications. *Environmental Chemistry. 11*, 609-623. DOI: 10.1071/EN14127. (*Cover article*). .

UT-5. Sanpui, P., Zheng, X., Loeb, J. C., Bisesi Jr., J. H., Khan, I. A., Afrooz, A. R. M. N., Liu, K., Badireddy, A. R., Wiesner, M. R., Ferguson, P. L., Saleh, N. B., Lednicky, J. A., Sabo-Attwood, T. (December, 2014). Single-Walled Carbon Nanotubes Increase Pandemic Influenza A H1N1 Virus

Infectivity of Lung Epithelial Cells. *Particle and Fibre Toxicology. 11 (66)*, 1-15. DOI: 10.1186/s12989-014-0066-0.

UT-6. Afrooz, A. R. M. N., Hussain, S. M., Saleh, N. B. (December, 2014). Aggregate Size and Structure Determination of Nanomaterials in Physiological Media: Importance of Dynamic Evolution. *Journal of Nanoparticle Research. 16 (12)*, 2771. DOI: 10.1007/ s11051-014-2771-x.

UT-7. Saleh, N. B., Aich, N., Plazas-Tuttle, J., Lead, J. R., Lowry, G. V. (February, 2015). Research Strategy to Determine When Novel Nanohybrids Pose Unique Environmental Risks. *Environmental Science: Nano. 2 (1)*, 11-18. DOI: 10.1039/C4EN00104D. (*Cover article*).

UT-8. Khan, I. A., Flora, J. R. V., Afrooz, A. R. M. N., Aich, N., Schierz, P. A., Ferguson, P. L., Sabo-Attwood, T., Saleh, N. B. (May, 2015). Change in Chirality of Semiconducting Single-Walled Carbon Nanotubes Can Overcome Anionic Surfactant Stabilization: A Systematic Study of Aggregation Kinetics. *Environmental Chemistry. 12 (6)*, 652-661. DOI: 10.1071/EN14176.

UT-9. Bisesi Jr., J. H., Ngo, T., Ponnavolu, S., Liu, K., Lavelle, C. M., Afrooz, A. R. M. N., Saleh, N. B., Ferguson, P. L., Denslow, N. D., Sabo-Attwood, T. (June, 2015). Examination of Single-Walled Carbon Nanotubes Uptake and Toxicity from Dietary Exposure: Tracking Movement and Impacts in the Gastrointestinal System. *Nanomaterials. 5 (2)*, 1066-1086. DOI: 10.3390/nano5021066.

UT-10. Plazas-Tuttle, J., Rowles III, L. S., Chen, H., Bisesi Jr., J. H., Sabo-Attwood, T., Saleh, N. B. (June, 2015). Dynamism of Stimuli-Responsive Nanohybrids: Environmental Implications. *Nanomaterials. 5 (2)*, 1102-1123. DOI: 10.3390/nano5021102.

UT-11. Saleh, N. B., Chambers, B., Aich, N., Plazas-Tuttle, J., Phung-Ngoc, H. N., Kirisits, M. J. (July, 2015). Mechanistic Lessons Learned from Studies of Planktonic Bacteria with Metallic Nanomaterials: Implications for Interactions Between Nanomaterials and Biofilm Bacteria. *frontiers in Microbiology. 6*, 1-8. DOI: 10.3389/fmicb.2015.00677.

UT-12. Grassian, V. H., Haes, A. J., Mudunkotuwa, I. A., Demokritou, P., Kane, A. B., Murphy, C. J., Hutchison, J. E., Isaacs, J. A., Jun, Y.-S., Karn, B., Khondaker, S. I., Larsen, S. C., Lau, B. L. T., Pettibone, J. M., Sadik, O. A., Saleh, N. B., Teague, C. (February, 2016). NanoEHS – Defining Fundamental Science Needs: No Easy Feat When the Simple Itself is Complex. *Environmental Science: Nano. 3 (1)*, 15-27. DOI: 10.1039/C5EN00112A.

UT-13. Aich, N., Boateng, L. K., Sabaraya, I. V., Das, D., Flora, J. R. V., Saleh, N. B. (February, 2016). Aggregation Kinetics of Higher-Order Fullerene Clusters in Aquatic Systems. *Environmental Science & Technology. 50 (7)*, 3562-3571. DOI: 10.1021/acs.est.5b05447.

UT-14. Afrooz, A. R. M. N., Das, D., Murphy, C. J., Vikesland, P. J., Saleh, N. B. (August, 2016). Co-transport of Gold Nanospheres with Single-Walled Carbon Nanotubes in Saturated Porous Media. *Water Research. 99*, 7-15. DOI: 10.1016/j.watres.2016.04.006.

UT-15. Saleh, N. B., Milliron, D. J., Aich, N., Katz, L. E., Liljestrand, H. M., Kirisits, M. J. (2016). Importance of Doping, Dopant Distribution, and Defects on Electronic Band Structure Alteration of Metal Oxide Nanoparticles: Implications for Reactive Oxygen Species. *Science of the Total Environment.* (*accepted*: *June 18, 2016*). DOI: 10.1016/j.scitotenv.2016.06.145.

University of Texas (submitted):

UT-16. Das, D., Plazas-Tuttle, J., Sabaraya, I. V., Jain, S. S., Sabo-Attwood, T., Saleh, N. B. (2016). An Elegant Method for Large Scale Synthesis of Metal Oxide-Carbon Nanotube Nanohybrids for Nano-environmental Application and Implication Studies. Environmental Science: Nano. (in review).

UT-17. Plazas-Tuttle, J., Das, D., Sabaraya, I. V., Saleh, N. B. (2016). Harnessing the power of microwave for water disinfection with nanohybrids. Environmental Science & Technology. (in review).

UT-18. Zheng, X., Bisesi Jr.. J. H., Chen, H., Afrooz, A. R. M. N., Lednicky, J., Saleh, N. B., Sabo-Attwood, T. (2016). Modulation of toll-like receptor activity by single-walled carbon nanotubes with distinct electronic structures. Toxicology. (in review).

UT-19. Bisesi Jr., J. H., Robinson, S., Lavelle, C., Ngo, T., Castillo, B., Das, D., Crosby, H., Ferguson, P. L., Saleh, N. B., Denslow, N., Sabo-Attwood, T. (2016). Influence of the gastrointestinal environment on the bioavailability of ethinyl estradiol sorbed to single-walled carbon nanotubes. Environmental Science and Technology. (in review).

University of South Carolina:

SC-1. Brady-Estevez, A. S., Schnoor, M. H., Vecitis, C. D., Saleh, N. B., Elimelech, M. (2010). Multiwalled Carbon Nanotube Filter: Improving Viral Removal at Low Pressure. *Langmuir. 26 (18)*, 14975-14982. DOI: 10.1021/la102783v.

SC-2. Saleh, N. B., Pfefferle, L. D., Elimelech, M. (2010). Influence of Biomacromolecules and Humic Acid on the Aggregation Kinetics of Single-Walled Carbon Nanotubes. *Environmental Science & Technology. 44 (7)*, 2412-2418. DOI: 10.1021/es903059t.

SC-3. Surdo, E. M., Khan, I. A., Choudhury, A. A., Saleh, N. B., Arnold, W. A. (2011). Barrier Properties of poly(vinyl alcohol) Membranes Containing Carbon Nanotubes or Activated Carbon. *Journal of Hazardous Materials. 188 (1-3)*, 334-340. DOI: 10.1016/j.jhazmat.2011.01.130.

SC-4. Joseph, L., Zaib, Q., Khan, I. A., Berge, N. D., Park, Y.-G., Saleh, N. B., Yoon, Y. (2011). Removal of Bisphenol A and 17a-Ethinyl Estradiol from Landfill Leachate Using Single-Walled Carbon Nanotubes. *Water Research. 45 (13)*, 4056-4068. DOI: 10.1016/j.watres.2011.05.015.

SC-5. Philbrook, N. A., Walker, V. K., Afrooz, A. R. M. N., Saleh, N. B., Winn, L. M. (2011). Investigating the Effects of Functionalized Carbon Nanotubes on Reproduction and Development in Drosophila Melanogaster and CD-1 Mice. *Reproductive Toxicology. 32 (4)*, 442-448. DOI: 10.1016/j.reprotox.2011.09.002.

SC-6. Philbrook, N. A., Winn, L. M., Afrooz, A. R. M. N., Saleh, N. B., Walker, V. K. (2011). The Effect of TiO_2 and Ag Nanoparticles on Reproduction and Development of Drosophila Melanogaster and CD-1 mice. *Toxicology and Applied Pharmacology. 257 (3)*, 429-436. DOI: 10.1016/j.taap.2011.09.027.

SC-7. Aich, N., Flora, J. R. V., Saleh, N. B. (2012). Preparation and Characterization of Stable Aqueous Higher Order Fullerene. *Nanotechnology. 23 (5)*, 055705, 1-9. DOI: 10.1088/0957-4484/23/5/055705.

SC-8. Schaeublin, N. M., Braydich-Stolle, L. K., Maurer, E. I., Park, K., MacCuspie, R. I., Afrooz, A. R. M. N., Vaia, R. A., Saleh, N. B., Hussain, S. M. (2012). Does Shape Matter? Bioeffects of Gold Nanomaterials in a Human Skin Cell Model. *Langmuir. 28 (6)*, 3248-3258. DOI: 10.1021/la204081m.

SC-9. Zaib, Q., Khan, I. A., Saleh, N. B., Flora, J. R. V., Park, Y.-G., Yoon, Y. (2012). Removal of Bisphenol A and 17-beta-Estradiol by Single-Walled Carbon Nanotubes in Aqueous Solution: Adsorption and Molecular Modeling. *Water, Air, and Soil Pollution. 223 (6)*, 3281-3293. DOI: 10.1007/s11270-012-1109-5.

SC-10. Zaib, Q., Khan, I. A., Yoon, Y., Flora, J. R. V., Park, Y.-G., Saleh, N. B. (2012). Ultrasonication Study for Suspending Single-Walled Carbon Nanotubes in Water. *Journal of Nanoscience and Nanotechnology. 12 (5)*, 3909-3917. DOI: 10.1166/jnn.2012.6212.

SC-11. Mukhopadhyay, A., Grabinski, C., Afrooz, A. R. M. N., Saleh, N. B., Hussain, S. M. (2012). Effect of Gold Nanosphere Surface Chemistry on Protein Adsorption and Cell Uptake in vitro. *Applied Biochemistry and Biotechnology. 167 (2)*, 327-337. DOI: 10.1007/s12010-012-9666-z.

SC-12. Aich, N., Zohhadi, N., Khan, I. A., Matta, F., Ziehl, P., Saleh, N. B., (2012). Applied TEM Approach for Micro/Nanostructural Characterization of Carbon Nanotube Reinforced Cementitious Composites. *Journal of Research Updates in Polymer Science. 1 (1)*, 14-23. ISSN: 1929-5995.

SC-13. Zhang, W., Zhao, S., Rao, W., Snyder, J., Choi, J. K., Wang, J., Khan, I. A., Saleh, N. B., Mohler, P. J., Yu, J., Hund, T. J., Tang, C., and He, X. (2013). A Novel Core-Shell Microcapsule for Encapsulation and 3D Culture of Embryonic Stem Cells. *Journal of Materials Chemistry B. 1*, 1002-1009. DOI: 10.1039/C2TB00058J.

SC-14. Afrooz, A. R. M. N., Sivalapalan, S. T., Murphy, C. J., Hussain, S. M., Schlager, J. J., Saleh, N. B. (2013). Spheres vs. Rods: The Shape of Gold Nanoparticles Influences Aggregation and Deposition Behavior. *Chemosphere. 91 (1)*, 93-98. DOI: 10.1016/j.chemosphere.2012.11.031.

SC-15. Afrooz, A. R. M. N., Khan, I. A., Hussain, S. M., Saleh, N. B. (2013). Mechanistic Heteroaggregation of Gold Nanoparticles in a Wide Range of Solution Chemistry. *Environmental Science & Technology. 47 (4)*, 1853-1860. DOI: 10.1021/es3032709.

SC-16. Khan, I. A., Afrooz, A. R. M. N., Flora, J. R. V., Schierz, P. A., Ferguson, P. L., Sabo-Attwood, T., Saleh, N. B. (2013). Chirality Affects Aggregation Kinetics of Single-Walled Carbon Nanotubes. *Environmental Science & Technology. 47 (4)*, 1844-1852. DOI: 10.1021/es3030337.

SC-17. Aich, N., Appalla, A., Saleh, N. B., Ziehl, P. (2013). Triboluminescence for Distributed Damage Assessment in Cement-Based Materials. *Journal of Intelligent Material Systems and Structures. 24 (14)*, 1714-1721. DOI: 10.1177/1045389X13484100.

SC-18. Schrand, A. M., Lin, J. B., Garrett, C. M., Brownheim, S. V., Hussain, S. M., Cubadda, F., Afrooz, A. R. M. N., Saleh, N. B. (2013). Nanoparticle Dynamics in the Presence and Absence of a Cellular Uptake Altering Chemical. *Il Nuovo Cimento C, 36* (2), 117-129. DOI: 10.1393/ncc/i2013-11516-4.

SC-19. Khan, I. A., Berge, N. D., Sabo-Attwood, T., Ferguson, P. L., Saleh, N. B. (2013). Single-Walled Carbon Nanotube Transport in Representative Municipal Solid Waste Landfill Conditions. *Environmental Science & Technology. 47 (15)*, 8425-8433. DOI: 10.1021/es401748f.

SC-20. Khan, I. A., Aich, N., Afrooz, A. R. M. N., Flora, J. R. V., Schierz, P. A., Ferguson, P. L., Sabo-Attwood, T., Saleh, N. B. (2013). Fractal Structures of Single-Walled Carbon Nanotubes in

Biologically Relevant Conditions: Role of Chirality vs. Media Conditions. *Chemosphere. 93 (9)*, 1997-2003. DOI: 10.1016/j.chemosphere.2013.07.019.

SC-21. Aich, N., Boateng, L. K., Flora, J. R. V., Saleh, N. B. (2013). Preparation of Non-Aggregating Aqueous Fullerenes in Highly Saline Solutions with A Biocompatible Non-Ionic Polymer. *Nanotechnology. 24 (39)*, 395602, 1-10. DOI: 10.1088/0957-4484/24/39/395602.

SC-22. Saleh, N. B., Caicedo, J. M., Johnson, A., Afrooz, A. R. M. N., Khan, I. A. (2014). Nano in a Global Context: Modular Course Design with Integrated Ethics Improves Core Knowledge in Nanotechnology. *Journal of Nano Education. 6 (2)*, 124-131. DOI: 10.1166/jne.2014.1057.

SC-23. Chambers, B. A., Afrooz, A. R. M. N., Bae, S., Aich, N., Katz, L., Saleh, N. B., Kirisits, M. J. (2014). Effects of Chloride and Ionic Strength on Physical Morphology, Dissolution, and Bacterial Toxicity of Silver Nanoparticles. *Environmental Science and Technology. 48 (1)*, 761-769. DOI: 10.1021/es403969x.

Graduate and Postdoctoral Training:

GP-1. Saleh, N., Phenrat, T., Sirk, K., Dufour, B., Ok, J., Sarbu, T., Matyjaszewski, K., Tilton, R. D., Lowry, G. V. (2005). Adsorbed Triblock Copolymers Deliver Reactive Iron Nanoparticles to the Oil/Water Interface. *Nano Letters. 5 (12)*, 2489-2494. DOI: 10.1021/nl0518268.

GP-2. Saleh, N., Sarbu, T., Sirk, K., Lowry, G. V., Matyjaszewski, K., Tilton, R. D. (2005). Oil-in-Water Emulsions Stabilized by Highly Charged Polyelectrolyte-Grafted Silica Nanoparticles. *Langmuir. 21 (22)*, 9873-9878. DOI: 10.1021/la050654r.

GP-3. Long, T. C., Saleh, N., Tilton, R. D., Lowry, G. V., Veronesi, B. (2006). Titanium Dioxide (P25) Produces Reactive Oxygen Species in Immortalized Brain Microglia (BV2): Implications for Nanoparticle Neurotoxicity. *Environmental Science & Technology. 40 (14)*, 4346-4352. DOI: 10.1021/es060589n.

GP-4. Long, T. C., Tajuba, J., Sama, P., Saleh, N., Swartz, C., Parker, J., Hester, S., Lowry, G. V., Veronesi, B. (2007). Nanosize Titanium Dioxide Stimulates Reactive Oxygen Species in Brain Microglia and Damages Neurons in vitro. *Environmental Health Perspectives. 115 (11)*, 1631-1637. DOI: 10.1289/ehp.10216.

GP-5. Phenrat, T., Saleh, N., Sirk, K., Tilton, R. D., Lowry, G. V. (2007). Aggregation and Sedimentation of Aqueous Nanoscale Zerovalent Iron Dispersions. *Environmental Science & Technology. 41 (1)*, 284-290. DOI: 10.1021/es061349a.

GP-6. Saleh, N., Sirk, K., Liu, Y., Phenrat, T., Dufour, B., Matyjaszewski, K., Tilton, R. D., Lowry, G. V. (2007). Surface Modifications Enhance Nanoiron Transport and NAPL Targeting in Saturated Porous Media. *Environmental Engineering Science. 24 (1)*, 45-57. DOI: 10.1089/ees.2007.24.45.

GP-7. Jaisi, D. P., Saleh, N. B., Blake, R. E., Elimelech, M. (2008). Transport of Single-Walled Carbon Nanotubes in Porous Media: Filtration Mechanisms and Reversibility. *Environmental Science & Technology. 42 (22)*, 8317-8323. DOI: 10.1021/es801641v.

GP-8. Phenrat, T., Saleh, N., Sirk, K., Kim, H.-J., Tilton, R. D., Lowry, G. V. (2008). Stabilization of Aqueous Nanoscale Zerovalent Iron Dispersions by Anionic Polyelectrolytes: Adsorbed Anionic Polyelectrolyte Layer Properties and Their Effect on Aggregation and Sedimentation. *Journal of Nanoparticle Research. 10 (5)*, 795-814. DOI: 10.1007/s11051-007-9315-6.

GP-9. Saleh, N., Kim, H.-J., Phenrat, T., Matyjaszewski, K., Tilton, R. D., Lowry, G. V. (2008). Ionic Strength and Composition Affect the Mobility of Surface-Modified Fe-0 Nanoparticles in Water-Saturated Sand Columns. *Environmental Science & Technology. 42 (9)*, 3349-3355. DOI: 10.1021/es071936b.

GP-10. Saleh, N. B., Pfefferle, L. D., Elimelech, M. (2008). Aggregation Kinetics of Multiwalled Carbon Nanotubes in Aquatic Systems: Measurements and Environmental Implications. *Environmental Science & Technology. 42 (21)*, 7963-7969. DOI: 10.1021/es801251c.

GP-11. Veronesi, B., Tajuba, J., Saleh, N., Ward, W., Hester, S., Carter, J., Lowry, G. V. (2008). Functionally Charged Polystyrene Particles Activate Immortalized Mouse Microglia (BV2): Cellular and Genomic Response. *Nanotoxicology. 2 (3)*, 130-143. DOI: 10.1080/17435390802296347.

GP-12. Sirk, K. M., Saleh, N. B., Phenrat, T., Kim, H.-J., Dufour, B., Ok, J., Golas, P. L., Matyjaszewski, K., Lowry, G. V., Tilton, R. D. (2009). Effect of Adsorbed Polyelectrolytes on Nanoscale Zero Valent Iron Particle Attachment to Soil Surface Models. *Environmental Science & Technology. 43 (10)*, 3803-3808. DOI: 10.1021/es803589t.

B. Books, Chapters of Books; Editor of Books

Book (1):

UT-1. Saleh, N. B., Vicki Grassian (2019). Introduction to the Environmental Implications of Nanomaterials. John Wiley and Sons Inc. (book proposal accepted).

Book Chapters Authored (in print or accepted, 5):

Underlining indicates supervised student(s); italicized items are accepted chapters

University of Texas:

UTB-1. Saleh, N. B., Lead, J. R., Aich, N., Das, D., Khan, I. A. (2014). Roles of Geo- and Bio-Macromolecules on Environmental Interactions of Nanomaterials. *Bio-inspired Nanotechnology-From Surface Analysis to Applications*. 257-290.

UTB-2. Aich, N., Plazas-Tuttle, J., Saleh, N. B. (2015). Fullerenes, Higher Fullerenes, and their Hybrids: Synthesis, Characterization, and Environmental Considerations. *Carbon Nanomaterials for Advanced Energy Systems: Advances in Materials Synthesis and Device Applications*. 3-46.

UTB-3. Zohhadi, N., Aich, N., Matta, F., Saleh, N. B., Ziehl, P. (2015). Graphene Nanoreinforcement for Cement Composites. *Nanotechnology in Construction*. 265-270.

UTB-4. Saleh, N. B., Afrooz, A. R. M. N., Plazas-Tuttle, J., Khan, I. A., Hussain, S. M. (2016). Aggregation Rate and Aggregate Structure Determination of Nanomaterials under Biological Exposure Conditions. Advances in Characterization Techniques for Nanotoxicology. (In press).

UTB-5. Saleh, N. B., Afrooz, A. R. M. N., Aich, N., Plazas-Tuttle, J. (2016). Aggregation Kinetics and Fractal Dimension of Nanomaterials in Environmental Systems. Engineered Nanoparticles and the Environment: Biophysicochemical Processes and Biotoxicity. (In press).

C. Refereed Conference Proceedings

*Poster presentations are noted. Underlining indicates supervised student(s) and *indicates presenter.*

University of Texas:

UT-1. *Das, D., Aich, N., Irin, F., Boateng, L., Flora, J., Green, M.J., Saleh, N.B., "Surface Coating Dependent Aggregation Kinetics of Graphene Suspensions", 247th ACS National Meeting, March 16-20, 2014, Dallas, TX (*poster*).

UT-2. *Aich, N., Rigdon, W.A., Das, D., Plazas-Tuttle, J., Huang, X., Saleh, N.B., "Hybridization with titania change aggregation kinetics of carbon nanotubes", 247th ACS National Meeting, March 16-20, 2014, Dallas, TX (*poster*).

UT-3. Saleh, N.B., *Aich, N., Chambers, B.A., Afrooz, A. R. M. N., Kirisits, M.J., "Influence of Tin Doping on Environmental Interactions of Nano Indium Oxides in Aqueous Systems", 247th ACS National Meeting, March 16-20, 2014, Dallas, TX (*poster*).

UT-4. *Saleh, N. B., Rowles III, L. S., Aich, N., "Synthesis and characterization of carbonaceous nanomaterial-multimetallic hybrids for simultaneous removal of radioactive and organic contaminants: A case study on Navajo Nation", 247th ACS National Meeting, March 16-20, 2014, Dallas, TX.

UT-5. *Abtahi, S. M. H., Jones, J., Vikesland, P. J., Murphy, C. J., Saleh, N. B., "Colloidal stability of elongated shaped gold nanoparticles in aquatic environment", 248th ACS National Meeting, Aug 10-14, 2014, San Francisco, CA.

UT-6. *Saleh, N. B., Sabo-Attwood, Huang, X., "Emergent properties of nanohybrids and their potential environmental implications", 248th ACS National Meeting, Aug 10-14, 2014, San Francisco, CA.

UT-7. *Saleh, N. B., Sabo-Attwood, T., Huang, X., "Metallic Nanoparticles when Hybridized to Multiwalled Carbon Nanotubes Alter Aggregation Kinetics in Aqueous Environment", 3rd Sustainable Nanotechnology Organization Conference, November 02-04, 2014 Boston, MA.

UT-8. *Saleh, N. B., Lawler, D. F., Youn, S., Mikelonis, A., "State of fate and transport research: System and material complexities", 89th ACS Colloid and Surface Science Symposium, June 14-16, 2015, Pittsburgh, PA (*Keynote Lecture*).

UT-9. *Saleh, N. B., Rowles III, S. L., Lawler, D. F., "Pottery inspired nano-enabled ceramic filters for point-of-use water treatment", International WaTER Conference, University of Oklahoma, September 21-23, 2015, Norman, OK.

UT-10. *Das, D., Afrooz, A. R. M. N., Lednicky, J., Sabo-Attwood, T., Saleh, N. B., "Nano-bio interaction: Influence of carbon nanotubes on virus like particle (VLP) transport through saturated porous media", 250th ACS National Meeting, August 16-20, 2015, Boston, MA.

UT-11. Das, D., Sabaraya, I. V., Aich, N., *Saleh, N. B., "Aggregation kinetics of carbon nanotube and metal or metal oxide nanohybrids in aquatic environment", 250th ACS National Meeting, August 16-20, 2015, Boston, MA.

UT-12. Afrooz, A. R. M. N., *Das, D., Murphy, C. J., Vikesland, P. J., Saleh, N. B., "Co-transport of gold nanospheres with single-walled carbon nanotubes in saturated porous media", 250th ACS National Meeting, August 16-20, 2015, Boston, MA.

UT-13. *Saleh, N. B., Das, D., Aich, N., "Aggregation and transport of metal-carbonaceous nanotube nanohybrids in environmentally relevant conditions", 4th Sustainable Nanotechnology Organization Conference, November 08-10, 2015, Portland, OR.

UT-14. *Saleh, N. B., Kirisits, M. J., Gorman, M. "Integrating nanoscale principles with social and ethical aspects of nanotechnology", 4th Sustainable Nanotechnology Organization Conference, November 08-10, 2015, Portland, OR.

UT-15. Saleh, N. B. "Aggregation and transport of metal-carbonaceous nanotube nanohybrids under environmentally relevant conditions", Emerging Contaminants Summit, March 1-2, 2016, Westminster, CO.

UT-16. *Saleh, N. B., Rowles III, S. L., Lawler, D. F., "Pottery inspired nano-enabled ceramic filters for point-of-use water treatment", Texas Water 2016, April 22, 2016, Fort Worth, TX.

UT-17. *Saleh, N. B., Plazas-Tuttle, J., "Novel Nanoscale Hetero-structures Enabling Microwave Radiation to Disinfect Aquaculture-Relevant Water", IWA Nano and Water Specialist Conference, May 16-18, 2016, Rice University, Houston, TX.

UT-18. *Saleh, N. B. Das, D., Sabaraya, I. V., "Role of Metal-oxides on Titania-Multiwalled Carbon Nanotube Heterostructure Aggregation and Transport in Aqueous Environment", 90th ACS Colloid and Surface Science Symposium, June 05-08, 2016, Cambridge, MA.

UT-19. *Sabaraya, I. V., Das, D., Saleh, N. B., "Photo-transformation of titanium dioxide- and zinc oxide-multiwalled carbon nanotube heterostructures in aqueous environment", 252nd ACS National Meeting, August 21-25, 2016, Philadelphia, PA.

UT-20. *Plazas-Tuttle, J., Das, D., Saleh, N. B., "Power of Novel Metal Oxide-Carbon Nanotube Heterostructures: Enabling Microwave to Disinfect Water for Aquaculture", 252nd ACS National Meeting, August 21-25, 2016, Philadelphia, PA.

University of South Carolina:

SC-1. *Saleh, N. B., Pfefferle, L. D., Elimelech, M. "Aggregation Kinetics of Carbon Nanotubes in the Presence of Biomacromolecules" American Chemical Society 237th National Meeting, March 22-26, 2009, Salt lake City, UT.

SC-2. *Saleh, N. B., Pfefferle, L. D., Elimelech, M. "Influence of Natural Organic Matter on Deposition Rate of Single-walled Carbon Nanotubes" American Chemical Society 237th National Meeting, March 22-26, 2009, Salt lake City, UT.

SC-3. *Saleh, N. B. "Aggregation and Deposition Behavior of Carbon Nanotubes in Aquatic Environments" Clemson Carbon Conference, July 11-16, 2010, Clemson, SC.

SC-4. *Afrooz, A. R. M. N., Zaib, Q., Decho, A. W., Saleh, N. B. "Role of Nanoparticle Geometry on Nano-bio Interaction: A Quest to Separate Physics from Chemistry", ACS National Meeting, Aug 22-26, 2010, Boston, MA.

SC-5. *Aich, N., Saleh, N. B. "Aggregation Kinetics of Fullerene-Single-walled Carbon Nanotube Hybrids", ACS National Meeting, Aug 22-26, 2010, Boston, MA.

SC-6. *Khan, I. A., Ferguson, P. L., Sabo-Attwood, T., Saleh, N. B. "Systematic Change in Chirality Affects Aggregation Kinetics of Single-Walled Carbon Nanotubes", ACS National Meeting, Aug 22-26, 2010, Boston, MA.

SC-7. *Saleh, N. B., Afrooz, A. R. M. N., Aich, N., Khan, I. A., "Filtration of anisotropic and hybrid nanomaterials", 240th ACS National Meeting, August, 22-26, 2010, Boston, MA.

SC-8. *Aich, N., Saleh, N. B. "Aggregation kinetics of higher order fullerenes in aquatic environment", ACS National Meeting, Mar 27-31, 2011, Anaheim, CA.

SC-9. *Aich, N., Saleh, N. B. "Aggregation kinetics of endohedral metallofullerene-single-walled carbon nanohorn and nanotube peapods", ACS National Meeting, Mar 27-31, 2011, Anaheim, CA.

SC-10. *Afrooz, A. R. M. N., Saleh, N. B. " Aggregation kinetics of gold nanorods in aquatic systems: Role of aspect ratio ", ACS National Meeting, Mar 27-31, 2011, Anaheim, CA.

SC-11. *Khan, I. A., Ferguson, P. L., Sabo-Attwood, T., Saleh, N. B. " Fractal structures of single-walled carbon nanotubes in environmental and biologically relevant aqueous conditions: Role of chirality", ACS National Meeting, Mar 27-31, 2011, Anaheim, CA.

SC-12. *Khan, I. A., Ferguson, P. L., Sabo-Attwood, T., Saleh, N. B. "Chirality affects aggregation kinetics of single-walled carbon nanotubes", ACS National Meeting, Mar 27-31, 2011, Anaheim, CA.

SC-13. *Joseph, L., Zaib, Q., Khan, I. A., Berge, N., Park, Y.-G., Saleh, N. B., Yoon, Y. "Removal of Bisphenol A and 17a-Ethinyl Estradiol from Landfill Leachate Using Carbon Nanotubes", American Water Works Association ACE, June 12-16, 2011, Washington, DC.

SC-14. *Saleh, N. B., Caicedo, J., Johnson, A. "Nano in a Global Context", Biennial Conference on Chemical Education, July 29-Aug 02, 2012, The Pennsylvania State University, University Park, PA.

SC-15. *Sabo-Attwood, T. Bisesi, J. H., Saleh, N. B., Afrooz, A. R. M. N., Parks, A. N., Ferguson, P. L., Merten, J. "Dynamics of SWNT distribution and aggregate structure during aquatic exposures", 1st Sustainable Nanotechnology Organization Conference, Nov 04-06, 2012, Arlington, VA (*poster*).

SC-16. *Saleh, N. B., Afrooz, A. R. M. N., Khan, I. A., Hussain, S. M. "Mechanistic Hetero-Aggregation of Gold Nanoparticles for a Wide Range of Solution Chemistries", 1st Sustainable Nanotechnology Organization Conference, Nov 04-06, 2012, Arlington, VA (*poster*).

SC-17. *Aich, N., Flora, J. R. V., Boatang, L., Saleh, N. B. "Size tuned aqueous nC60s and nC70s stabilized with biocompatible surface coatings", 245th ACS National Meeting, April 7-11, 2013, New Orleans, LA.

SC-18. *Afrooz, A. R. M. N., Khan, I. A., Hussain, S. M., Saleh, N. B. "Mechanistic heteroaggregation of gold nanoparticles in presence of nonionic polymer modified single-walled carbon nanotubes", 245th ACS National Meeting, April 7-11, 2013, New Orleans, LA.

SC-19. *Saleh, N. B., Hussain, S. M., Afrooz, A. R. M. N. "Dynamic aggregation and fractal structure determination of gold nanoparticles in biological media conditions", 245th ACS National Meeting, New Orleans, LA, April 7-11, 2013.

Graduate and Postdoctoral Training:

GP-1. *Saleh, N. B., Sirk, K., Sarbu, T., Lowry, G. V., Tilton, R.D., Matyjaszewski, K., Redden, G., "Targeted Delivery of Nanoiron to the NAPL-water Interface", 79th ACS Colloid And Surface Science Symposium, Potsdam, NY. July 12-15, 2005.

GP-2. *Saleh, N. B., Sirk, K., Sarbu, T., Tilton, R.D., Matyjaszewski, K., Lowry, G. V., "Transport and DNAPL Targeting of Polyelectrolyte- and Surfactant-modified Nanoiron", 230th ACS Meeting and Exposition. Washington, DC. August 28-September 1, 2005.

GP-3. *Saleh, N. B., Kim, H. J., Phenrat, T., Sirk, K., Dufour, B., Matyjaszewski, K., Tilton, R. D., Lowry, G. V. "Long-range transport of polymer-modified nanoiron in saturated porous sand and real aquifer media", 80th ACS Colloid And Surface Science Symposium, Boulder, CO. June 18-21, 2006.

GP-4. *Saleh, N. B., Sirk, K., Liu, Y., Phenrat, T., Dufour, B., Matyjaszewski, K., Tilton, R. D., Lowry, G. V., "Surface modifications enhance colloidal iron transport and deliver them to the NAPL/water interface", 232nd ACS National Meeting, San Francisco, CA, September 10-14, 2006.

GP-5. *Saleh, N. B., Phenrat, T., Tilton, R. D., Lowry, G. V. "Porewater velocity and collector grain size affects the mobility of surface-modified nanoiron in water-saturated porous media." Division of Colloid and Surface Chemistry for the 233nd ACS National Meeting, Chicago, IL March 25-29, 2007.

GP-6. *Saleh, N. B., Pfefferle, L., Elimelech, M. "Aggregation Kinetics of Multi-walled Carbon Nanotubes in Aquatic Systems." The 235th ACS National Meeting, New Orleans, LA, April 6-10, 2008.

GP-7. *Jaisi, P. D., Saleh, N. B., Blake, R. E., Elimelech, M. "Filtration Mechanisms of Single-walled Carbon Nanotubes in Porous Media" AIChE Annual Meeting, Philadelphia, PA, November 16-21, 2008.

GP-8. *Saleh, N. B., Pfefferle, L., Elimelech, M. "Aggregation Kinetics of Multi-walled Carbon Nanotubes in Aquatic Systems" AIChE Annual Meeting, Philadelphia, PA, November 16-21, 2008.

GP-9. Saleh, N. B., Pfefferle, L., Elimelech, M. "Aggregation Kinetics of Carbon Nanotubes in the Presence of Biomacromolecules" AIChE Annual Meeting, Philadelphia, PA, November 16-21, 2008.

ORAL PRESENTATIONS:

Invited Seminars or Conference Presentations:

University of Texas:

UT-1. "Nanomaterial Implications: Controlled and Complex Systems", Civil and Environmental Engineering, Temple University, August 01, 2014, Philadelphia, PA.

UT-2. "Environmental Behavior of Nanomaterials: Implications of Material and Environmental Complexities", Civil and Environmental Engineering, Rice University, September 19, 2014, Houston, TX.

UT-3. "Environmental Behavior of Nanomaterials: Implications of Material and Environmental Complexities", Civil and Environmental Engineering, Cornell University, October 02, 2014, Ithaca, NY.

UT-4. "Environmental Behavior of Nanomaterials: Implications of Material and Environmental Complexities", Civil and Environmental Engineering, University of Illinois-Urbana Champaign, October 16, 2014, Urbana, IL.

UT-5. "Environmental Behavior of Nanomaterials: Implications of Material and Environmental Complexities", College of Public Health and Health Professions, University of Florida, March 13, 2015, Gainesville, FL.

UT-6. "Sustainable use of Nanomaterials for Environmental Applications", Civil and Environmental Engineering, Manhattan College, July 24, 2015, New York, NY.

UT-7. "Nanomaterials for Environmental Applications: Sustainable Use", Civil and Environmental Engineering, University of New Orleans, July 01, 2016, New Orleans, LA.

University of South Carolina:

SC-1. "Application and Implication of Nanomaterials", University of South Carolina, Mechanical Engineering, Columbia, SC, April 2009.

SC-2. "Application and Implication of Nanomaterials", Allen University, Columbia, SC, September, 2009.

SC-3. "Fundamental Aggregation and Surface Interactions of Carbon Nanotubes in Aquatic Systems", Institute of Environmental Toxicology, Clemson University, Columbia, SC, February 2010.

SC-4. "Fundamental Aggregation and Surface Interactions of Carbon Nanotubes in Aquatic Systems", University of South Carolina, Mechanical Engineering, Columbia, SC, March 2010.

SC-5. "Aggregation and Surface Interactions of Carbon Nanotubes in Aquatic Systems", Virginia Tech, Mechanical Engineering, April 2010, Blacksburg, VA.

SC-6. "Aggregation and Surface Interaction of Carbonaceous and Metallic Nanomaterials: Environmental and Biologically Relevant Conditions", Wright Patterson Airforce Base, February 10, 2011, Dayton, OH.

SC-7. "Aggregation and Interfacial interaction of Nanomaterials: Environmental and Biologically Relevant Conditions", Savannah River National Laboratory (SRNL), February 17, 2012, Aiken, SC.

SC-8. "Carbonaceous Nanomaterials: Application for Environmental Remediation", University of Arab Emirates University, April 2012, Al-Ain, United Arab Emirates.

SC-9. "Aggregation Behavior of Nanomaterials in Singular and Binary Systems", Environmental Engineering and Earth Sciences, Clemson University, November 02, 2012, Anderson, SC.

SC-10. "Aggregation Behavior of Nanomaterials in Environmental and Biological Conditions", Material Science and Engineering and Civil Engineering, University of Texas-Arlington, November 09, 2012, Arlington, TX.

SC-11. "Aggregation Kinetics and Structure of Nanomaterials in Singular and Binary Systems", Pathology and Psychology Research Branch, National Institute for Occupational Safety and Health (NIOSH), December 04, 2012, Morgantown, PA.

SC-12. Saleh, N. B. "Accurate aggregate size and structure determination in physiological conditions-Ignored fact in nanotoxicology?", 52nd Annual Meeting of Society of Toxicology, March 10-14, 2013, San Antonio, TX (*roundtable lecture*).

SC-13. "Aggregation and deposition of nanomaterials in controlled and complex natural systems", Arnold School of Public Health, University of South Carolina, September 04, 2013, Columbia, SC.

SC-14. "Fate and Transport of Carbonaceous Nanomaterials: Progress and Data Gaps", 2013 NSF-EPA-USDA Nanoscale Science and Engineering Grantees Conference, Dec 04-06, 2013, Washington, DC.

Graduate and Postdoctoral Training:

GP-1. "Developing Metallic Nanoparticles for In Situ Remediation of Subsurface DNAPL", Chatham University, October 2004, Pittsburgh, PA.

PATENTS:

University of Texas:
Underlining indicates supervised student(s)

UT-1. Saleh, N. B. and Plazas-Tuttle, J. (2016). Microwave Absorbing Carbon-Metal Oxides and Modes of Using, Including Water Disinfection. (*Patent Pending*). Application# 15230041.

University of South Carolina:
Underlining indicates supervised student(s)

SC-1. Saleh, N. B., Matta, F., Ziehl, P., Aich, N., Zohhadi, N., Khan, I. A. (2014). Polymeric Additive for Strength, Deformability, and Toughness Enhancement of Cemetitious Materials and Composites. Publication number: US 8907050 B2.

GRANTS AND CONTRACTS:

Amounts indicated parenthetically (for joint proposals) are Saleh shares.

University of Texas:

Co-Investigators	Title	Agency	Grant Total	Grant Period
N. B. Saleh (PI)	Collaborative Research: Fate, Transport, and Organismal Uptake of Rod-Shaped Nanomaterials	National Science Foundation	$119,016	01/01/14-09/30/16
N. B. Saleh (PI)	Contribution of Toll-Like Receptors in the Pulmonary Response to Nanoparticles and Pathogens	National Institute of Health	$173,016	05/01/14-04/30/17

N. B. Saleh (PI) M. J. Kirisits H. Hart B. Korgel	NUE: Sustainable Nanotechnology Education for Undergraduate Engineering Students	National Science Foundation	$199,997 ($120,000)	10/01/14- 09/30/17
D. Lawler (PI) L. Katz M. J. Kirisits K. Kinney N. B. Saleh G. Speitel	Water Innovation Network for Sustainable Small Systems (WINSSS)	Environmental Protection Agency	$1,456,225 ($100,000)	09/01/14- 08/31/17
N. B. Saleh (PI) Amit Bhasin	Effectively Dispersed Carbon Nanotube Enhanced Asphalt: Novel Foamed Delivery and Traditional Mixing Techniques	Texas Department of Transportation	$265,438 ($110,000)	01/01/15- 12/31/16
N. B. Saleh (PI) M. J. Kirisits D. Milliron L. Katz	UNS: Role of dopant concentration and distribution in the environmental behavior of indium tin oxide nanoparticles	National Science Foundation	$299,917 ($100,000)	06/01/15- 05/30/17
N. B. Saleh (PI) M. J. Kirisits	Development of nanomaterial use, transport, and disposal guidelines for laboratories at UT Austin and other THWRC Consortium Universities	Texas Hazardous Waste Research Center	$6,000 ($3,000)	09/01/15- 07/15/17
N. B. Saleh (PI)	Collaborative Research: EAGER: Interaction of Carbon-Metal Nanohybrids at Environmental Interfaces	National Science Foundation	$80,135	05/20/16- 04/30/17
N. B. Saleh (PI) D. Lawler	A Nano-Silver and Zeolite Solution: Ceramic Water Filters for Disinfection and Hardness Removal	Environmental Protection Agency	$14,999 ($10,000)	08/15/16- 08/14/17
		Grand total	$2,614,923	
		Saleh share	**$815,167**	

University of South Carolina:

Co-Investigators	Title	Agency	Grant Total	Grant Period
N. B. Saleh (PI) T. Sabo-Attwood P. L. Ferguson	Influence of diameter and chirality of single-walled carbon nanotubes on their fate and effects in the aquatic environment	National Science Foundation	$436,013 ($160,108)	10/01/09- 09/30/13
N. B. Saleh (PI) J. Caicedo A. Johnson	NUE: Nano in a Global Context for Engineering Students	National Science Foundation	$200,000 ($180,000)	10/01/10- 09/30/14
Y. Yoon (PI) N. B. Saleh J. R. V. Flora	Applications of Carbon Nanotubes in UF and MF Membranes: Pretreatment in Seawater Desalination	Gold Star Engineering and Construction Co., South Korea	$220,000 ($73,000)	05/01/10- 04/30/13
N. B. Saleh (PI)	Mechanistic Understanding of Nanomaterial Toxicity: Aggregation and Surface Interaction in Biologically Relevant Conditions	US Air Force Research Lab	$60,000	10/15/11- 04/30/13
J. Goodall (PI) N. B. Saleh M. Meadows	A GIS-based Mitigation Forecasting Tool and Study on Advanced Mitigation Processes used by DOTs	SC DOT	$413,837 ($200,000)	01/01/13- 12/31/15
		Grand total	$1,329,850	
		Saleh Share	**$673,108**	

*Total **career** external research funding raised $3,944,773; candidate's share is $1,488,275.*

PH.D. SUPERVISION COMPLETED (3):

University of Texas (2):

Afrooz, A. R. M. Nabiul	2015	Civil, Architectural and Environmental Engineering	University of Texas
Aich, Nirupam	2015	Civil, Architectural and Environmental Engineering	University of Texas

University of South Carolina (1):

Khan, Iftheker A.	2012	Civil and Environmental Engineering	University of South Carolina

M.S. SUPERVISION COMPLETED (4.5):

University of Texas (2):

Sabaraya, Indu V.	2016	Civil, Architectural and Environmental Engineering	University of Texas

Rowles III, Stetson (co-advised)	2016	Civil, Architectural and Environmental Engineering	University of Texas

University of South Carolina (2.5):

Zaib, Qammer (*co-advised*)	2011	Civil and Environmental Engineering	University of South Carolina
Nirupam Aich	2012	Civil and Environmental Engineering	University of South Carolina
A. R. M. Nabiul Afrooz	2012	Civil and Environmental Engineering	University of South Carolina

PH.D. IN PROGRESS (3.5):

University of Texas:

A. Students admitted to candidacy:

Plazas-Tuttle, Jaime; expected to graduate in May 2017
Das, Dipesh; expected to graduate in May 2017

B. Post M.S. students preparing to take Ph.D. qualifying exam:

Sabaraya, Indu Venu; expected to graduate in December 2018
Rowles III, Lewis Stetson (co-advised); expected to graduate in December 2017

M.S. IN PROGRESS (2.5):

University of Texas:

Ngan, Christine K (co-advised); expected to graduate in May 2017
Merryman, Anna E.; expected to graduate in December 2017
Hornstra, Allison V.; expected to graduate in May 2018

UNDERGRADUATE ADVISEES (8):

University of Texas (4):

Gregory Latimer*, **Erica Mason, Kelsey Turpin, and Sneha Jain

**Awarded Undergraduate Research Grant at University of Texas at Austin, May 2014.*
***Erica Mason won poster awards in the Cockrell School of Engineering, May 2016.*

University of South Carolina (4):

Samuel Rollings, Tyler Clark, and Atif A. Choudhury, Lewis Stetson Rowles III

STUDENT AWARDS:

University of Texas:

Nirupam Aich (Ph.D. student), American Chemical Society Environmental Chemistry Graduate Student Award 2014

Erica Mason (undergraduate student), 1st place in Women in Engineering poster competition and 3rd place at the annual Poster Exhibition on Engineering Research (PEER) contest at Cockrell School of Engineering

University of South Carolina:

A. R. M. Nabiul Afrooz (Ph.D. student), American Chemical Society Environmental Chemistry Graduate Student Award 2013

Iftheker A. Khan (Ph.D. student), American Chemical Society Environmental Chemistry Graduate Student Award 2011

VITA:

Navid Saleh's research focuses on environmental implications and applications of nanomaterials. His lab studies nanomaterial fate and transport and evaluates mechanisms of nano-bio interaction on the implication aspects, while develops novel nano-enabled technologies for water treatment applications. Recent projects include: studying fundamental aggregation and deposition behavior of carbon nanotubes, anisotropic gold-nano particles, indium tin oxide, and conjugated nanohybrids; development of nano-enabled disinfection technology that harness the power of microwave irradiation; dispersion control of nanotubes for construction materials (cement and asphalt); and nano-education. His research has produced 49 publications in refereed journals and 5 book chapters. At the undergraduate level, Saleh teaches the "Introduction to Environmental Engineering" and two newly developed courses on nanotechnology: "Designing Sustainable Nanomaterials" and "Nanotechnology Laboratory" (co-taught with Dr. Kirisits). At the graduate level, he teaches a newly developed course, titled: "Environmental Implications of Nanotechnology".

Statistical Summary for "Assistant Professor Rank"

Navid Saleh

Table 1. Statistics for "Assistant Professor Rank" at University of Texas (UT)

Metric	Value
Peer-reviewed journal publications (in rank ***and total***)	15/50
Peer-reviewed conference proceedings (in rank at UT ***and total***)	20/48
Number of ***journal*** papers ***in rank*** with UT students ***as co-authors***	14
Total citations of all publications (career) ***from ISI Web of Knowledge***	3044
h-index (career) ***from ISI Web of Knowledge***	19
Total citations of all publications (career) ***from Google Scholar***	4213
h-index (career) ***from Google Scholar***	23
Total external research funding raised at UT	$2,614,923
Total external research funding raised at UT (candidate's share)	$815,167
Total number of external grants/contracts ***awarded at UT***	9
Number of external grants/contracts ***awarded at UT*** as PI	8
PhD students completed†	2 (2 sole advisor)
MS students completed†	1.5 (1 sole advisor)
PhD students in pipeline (as of 09/2016)	3.5 (3 sole advisor)
MS students in pipeline (as of 09/2016)	2.5 (2 sole advisor)
Number of courses taught	
Total # of students taught in organized courses	194
Average instructor evaluation for UG courses	4.45
Average instructor evaluation for Grad courses	4.30
Average course evaluation for UG courses	4.05
Average course evaluation for Grad courses	4.10
Teaching awards	
Student organizations advised	
Undergraduate ***researchers*** supervised	4
Service on journal editorial boards	1
Number of symposia organized	5

Table 2. Research Statistics for "Assistant Professor Rank" at University of South Carolina (USC)

Metric	Value
Peer-reviewed journal publications (in rank)	23
Peer-reviewed conference proceedings (in rank)	19
Number of ***journal*** papers ***in rank*** with USC students ***as co-authors***	21
Total external research funding raised at USC	$1,329,850
Total external research funding raised at USC (candidate's share)	$673,108
Total number of external grants/contracts ***awarded***	5
Number of external grants/contracts ***awarded*** as PI	3
PhD students completed	1 (1 sole advisor)
MS students completed	2.5 (2 sole advisor)

Complete reverse chronological list of publications and scholarly/creative works

Navid Saleh

Title of Dissertation: An assessment of novel polymeric coatings to enhance transport and in situ targeting of nanoiron for remediation of non-aqueous phase liquids (NAPLs)
Dissertation Advisor: Gregory V. Lowry

Section 1. Works published (or in an equivalent status), in press, accepted, or under contract while in current rank at UT Austin.

Underlining indicates supervised student(s)
#One of the 5 significant publications

Saleh, N. B., Milliron, D. J., Aich, N., Katz, L. E., Liljestrand, H. M., Kirisits, M. J. (2016). Importance of Doping, Dopant Distribution, and Defects on Electronic Band Structure Alteration of Metal Oxide Nanoparticles: Implications for Reactive Oxygen Species. *Science of the Total Environment.* (*accepted: June 18, 2016*). DOI: 10.1016/j.scitotenv.2016.06.145.

- Co-authors: Milliron is a faculty peer at Chemical Engineering of UT; Aich is a graduate student under my supervision at UT; Katz, Liljestrand, and Kirisits are faculty peers at CAEE of UT.
- Qualitative statement of contribution: I was the lead author who designed the study, led the analyses, and wrote most of the manuscript with my graduate student Aich. Faculty peers provided intellectual contribution.

#Afrooz, A. R. M. N., Das, D., Murphy, C. J., Vikesland, P. J., Saleh, N. B. (August, 2016). Co-transport of Gold Nanospheres with Single-Walled Carbon Nanotubes in Saturated Porous Media. *Water Research. 99*, 7-15. DOI: 10.1016/j.watres.2016.04.006.

- Co-authors: Afrooz and Das are graduate students under my supervision at UT; Murphy at University of Illinois and Vikesland at Virginia Teach are faculty peers.
- Qualitative statement of contribution: I have designed the study with my graduate students Afrooz and Das. The entire manuscript was written by my students, while I provided intellectual and editorial mentorship. The faculty peers provided intellectual contribution.

#Aich, N., Boateng, L. K., Sabaraya, I. V., Das, D., Flora, J. R. V., Saleh, N. B. (February, 2016). Aggregation Kinetics of Higher-Order Fullerene Clusters in Aquatic Systems. *Environmental Science & Technology. 50 (7)*, 3562-3571. DOI: 10.1021/acs.est.5b05447.

- Co-authors: Aich, Sabaraya, and Das are graduate students under my supervision at UT; Boateng is a graduate student at University of South Carolina (USC) under faculty peer Flora's supervision.
- Qualitative statement of contribution: I have designed the study with my graduate students. The manuscript was mostly written by my students, while I provided intellectual and editorial mentorship and significantly contributed in analyses. The graduate student and faculty peer at USC performed molecular modeling.

Grassian, V. H., Haes, A. J., Mudunkotuwa, I. A., Demokritou, P., Kane, A. B., Murphy, C. J., Hutchison, J. E., Isaacs, J. A., Jun, Y.-S., Karn, B., Khondaker, S. I., Larsen, S. C., Lau, B. L. T., Pettibone, J. M., Sadik, O. A., Saleh, N. B., Teague, C. (February, 2016). NanoEHS – Defining Fundamental Science Needs: No Easy Feat When the Simple Itself is Complex. *Environmental Science: Nano. 3 (1)*, 15-27. DOI: 10.1039/C5EN00112A.

- Co-authors: Faculty or professionals peers Grassian and Haes at University of Iowa; Demokritou at Harvard University; Kane at Brown University; Murphy at University of Illinois; Hutchison at University of Oregon; Isaacs at Northeastern University; Jun at Washington University at St. Louis; Karn at Sustainable Nanotechnology Organization; Khondaker at University of Central Florida; Larsen at University of Iowa; Lau at University of Massachusetts at Amherst; Pettibone at National Institute of Standards and Technology; Sadik at State University of New York at Birmingham; Teague at Pixelligent Technologies; Mudunkotuwa is a graduate student at University of Iowa.
- Qualitative statement of contribution: I have provided intellectual and editorial contribution to the manuscript, particularly in the aspect of next generation complex nanomaterials.

Saleh, N. B., Chambers, B., Aich, N., Plazas-Tuttle, J., Phung-Ngoc, H. N., Kirisits, M. J. (July, 2015). Mechanistic Lessons Learned from Studies of Planktonic Bacteria with Metallic Nanomaterials: Implications for Interactions Between Nanomaterials and Biofilm Bacteria. *frontiers in Microbiology. 6*, 1-8. DOI: 10.3389/fmicb.2015.00677.

- Co-authors: Aich and Plazas-Tuttle are graduate students under my supervision at UT; Chambers and Phung-Ngoc are graduate students under faculty peer Kirisits's supervision at UT.
- Qualitative statement of contribution: I have designed and led the analyses of this study. Graduate students under Kirisits and my supervision have written most of the manuscript under our mentorship.

Plazas-Tuttle, J., Rowles III, L. S., Chen, H., Bisesi Jr., J. H., Sabo-Attwood, T., Saleh, N. B. (June, 2015). Dynamism of Stimuli-Responsive Nanohybrids: Environmental Implications. *Nanomaterials. 5 (2)*, 1102-1123. DOI: 10.3390/nano5021102.

- Co-authors: Plazas-Tuttle and Rowles III are graduate students under my supervision at UT; Chen is a graduate student and Bisesi Jr. is a postdoctoral scholar under faculty peer Sabo-Attwood's supervision at University of Florida.
- Qualitative statement of contribution: I have designed the study and led the analyses and wrote nearly the entire manuscript with my graduate students. Faculty peer and her student and postdoc have provided intellectual contribution.

Bisesi Jr., J. H., Ngo, T., Ponnavolu, S., Liu, K., Lavelle, C. M., Afrooz, A. R. M. N., Saleh, N. B., Ferguson, P. L., Denslow, N. D., Sabo-Attwood, T. (June, 2015). Examination of Single-Walled Carbon Nanotubes Uptake and Toxicity from Dietary Exposure: Tracking Movement and Impacts in the Gastrointestinal System. *Nanomaterials. 5 (2)*, 1066-1086. DOI: 10.3390/nano5021066.

- Co-authors: Bisesi Jr. is a postdoctoral scholar and Ngo, Ponnavolu, Liu, and Lavelle are graduate students under faculty peer Sabo-Attwood's supervision at University of Florida; Afrooz is a graduate student under my supervision; Ferguson at Duke University and Denslow at University of Florida are other faculty peers.
- Qualitative statement of contribution: I have provided intellectual contribution and data analyses for this study. My group's contribution in this study was to decipher toxicological mechanism by performing physicochemical characterization of the nanomaterials; a key aspect in any nanotoxicological publication. Sabo-Attwood's group led this work.

Khan, I. A., Flora, J. R. V., Afrooz, A. R. M. N., Aich, N., Schierz, P. A., Ferguson, P. L., Sabo-Attwood, T., Saleh, N. B. (May, 2015). Change in Chirality of Semiconducting Single-Walled Carbon Nanotubes Can Overcome Anionic Surfactant Stabilization: A Systematic Study of Aggregation Kinetics. *Environmental Chemistry. 12 (6)*, 652-661. DOI: 10.1071/EN14176.

- Co-authors: Khan, Afrooz, and Aich are graduate students under my supervision; Faculty peers Flora at University of South Carolina; Ferguson at Duke University; Sabo-Attwood at University of Florida. Schierz was a graduate student under Ferguson's supervision at Duke University.
- Qualitative statement of contribution: I have designed the study with my graduate students. The manuscript was mostly written by my students, while I provided intellectual and editorial mentorship and significantly contributed in analyses. The faculty peers Flora, Ferguson, and Sabo-Attwood and graduate student Schierz provided intellectual contribution.

Saleh, N. B., Aich, N., Plazas-Tuttle, J., Lead, J. R., Lowry, G. V. (February, 2015). Research Strategy to Determine When Novel Nanohybrids Pose Unique Environmental Risks. *Environmental Science: Nano. 2 (1)*, 11-18. DOI: 10.1039/C4EN00104D. (*Cover article).*

- Co-authors: Aich and Plazas-Tuttle are graduate students under my supervision at UT; Faculty peers Lead at University of South Carolina; Lowry at Carnegie Mellon University .
- Qualitative statement of contribution: I was the lead author who designed the study, led the analyses, and wrote most of the manuscript with my graduate students. Faculty peers provided intellectual contribution.

Afrooz, A. R. M. N., Hussain, S. M., Saleh, N. B. (December, 2014). Aggregate Size and Structure Determination of Nanomaterials in Physiological Media: Importance of Dynamic Evolution. *Journal of Nanoparticle Research. 16 (12)*, 2771. DOI: 10.1007/ s11051-014-2771-x.

- Co-authors: Afrooz is a graduate student under my supervision at UT; Hussain is a professional peer at US Air Force Laboratory.
- Qualitative statement of contribution: I have designed the study with my graduate student. The study was performed and the manuscript was almost entirely written by Afrooz, while I provided intellectual and editorial mentorship and significantly contributed in analyses. Professional peer provided intellectual contribution.

Sanpui, P., Zheng, X., Loeb, J. C., Bisesi Jr., J. H., Khan, I. A., Afrooz, A. R. M. N., Liu, K., Badireddy, A. R., Wiesner, M. R., Ferguson, P. L., Saleh, N. B., Lednicky, J. A., Sabo-Attwood, T. (December, 2014). Single-Walled Carbon Nanotubes Increase Pandemic Influenza A H1N1 Virus

Infectivity of Lung Epithelial Cells. *Particle and Fibre Toxicology. 11 (66)*, 1-15. DOI: 10.1186/s12989-014-0066-0.

- Co-authors: Sanpui, Zheng, and Loeb are graduate students and Bisesi Jr. is a postdoctoral scholar under faculty peer Sabo-Attwood's supervision at University of Florida; Khan and Afrooz are graduate students under my supervision; Liu is a graduate student and Badireddy is a postdoctoral scholar under faculty peers Wiesner and Ferguson's supervision at Duke University; Lednicky is the other faculty peer at University of Florida.
- Qualitative statement of contribution: I have provided intellectual contribution and data analyses for this study. My group's contribution in this study was to decipher toxicological mechanism by performing physicochemical characterization of the nanomaterials; a key aspect in any nanotoxicological publication. Sabo-Attwood's group led this work.

Aich, N., Plazas-Tuttle, J., Lead, J. R., Saleh, N. B. (December, 2014). A Critical Review of Nanohybrids: Synthesis, Applications and Environmental Implications. *Environmental Chemistry. 11*, 609-623. DOI: 10.1071/EN14127. (*Cover article).*

- Co-authors: Aich and Plazas-Tuttle are graduate students under my supervision at UT; Lead at University of South Carolina is a faculty peer.
- Qualitative statement of contribution: I have designed the study and led the analyses. Aich and Plazas-Tuttle wrote most of the manuscript under my guidance. The faculty peer provided intellectual contribution.

Saleh, N. B., Afrooz, A. R. M. N., Bisesi Jr., J. H., Aich, N., Plazas-Tuttle, J., Sabo-Attwood, T. (June, 2014). Emergent Properties and Toxicological Considerations for Nanohybrid Materials in Aquatic Systems. *Nanomaterials. 4*, 372-407. DOI: 10.3390/nano4020372.

- Co-authors: Afrooz, Aich, and Plazas-Tuttle are graduate students under my supervision at UT; Bisesi Jr. is a postdoctoral scholar under faculty peer Sabo-Attwood's supervision at University of Florida
- Qualitative statement of contribution: I was the lead author who designed the study, led the analyses, and wrote most of the manuscript with my graduate students. The faculty peer and her postdoctoral scholar provided intellectual contribution.

Aich, N., Kim, E., ElBatanouny, M., Plazas-Tuttle, J., Yang, J., Ziehl, P., Saleh, N. B. (May, 2014). Detection of Crack Formation and Stress Distribution on Carbon Fiber Reinforced Polymer Specimens Through Triboluminescent-Based Imaging. *Journal of Intelligent Material Systems and Structures*. 1-8. DOI: 10.1177/1045389X14535017.

- Co-authors: Aich and Plazas-Tuttle are graduate students under my supervision; Kim is a graduate student under faculty peer Yang's supervision at University of Washington, Seattle; ElBatanouny is a postdoctoral scholar under faculty peer Ziehl's supervision at University of South Carolina.
- Qualitative statement of contribution: I have designed the study with my graduate students. The study was performed and the manuscript was mostly written by Aich and Plazas-Tuttle, while I provided intellectual and editorial mentorship and significantly contributed in analyses. Yang and Ziehl groups provided modeling support and intellectual contribution.

Bisesi Jr., J. H., Merten, J., Liu, K., Parks, A. N., Afrooz, A. R. M. N., Glenn, J. B., Klaine, S. J., Kane, A. S., Saleh, N. B., Ferguson, P. L., Sabo-Attwood, T. (January, 2014). Tracking and Quantificaiton of Single-Walled Carbon Nanotubes in Fish Using Near Infra Red Fluorescence. *Environmental Science & Technology. 48 (3)*, 1973-1983. DOI: 10.1021/es4046023.

- Co-authors: Bisesi Jr. is a postdoctoral scholar under faculty peer Sabo-Attwood's supervision at University of Florida; Merten is a graduate student at University of Florida; Liu and Parks are graduate students under faculty peer Ferguon's supervision at Duke University; Afrooz is a graduate student under my supervision at UT; Kane is a faculty peer at University of Florida; Glenn is a graduate student under faculty peer Klaine's supervision at Clemson University.
- Qualitative statement of contribution: I have provided intellectual contribution and data analyses for this study. My group's contribution in this study was to decipher toxicological mechanism by performing physicochemical characterization of the nanomaterials; a key aspect in any nanotoxicological publication. Sabo-Attwood's group led this work.

Section 2. Works published (or in equivalent status) while in current rank at other institution: University of South Carolina

#Chambers, B. A., Afrooz, A. R. M. N., Bae, S., Aich, N., Katz, L., Saleh, N. B., Kirisits, M. J. (2014). Effects of Chloride and Ionic Strength on Physical Morphology, Dissolution, and Bacterial Toxicity of Silver Nanoparticles. *Environmental Science and Technology. 48 (1)*, 761-769. DOI: 10.1021/es403969x.

- Co-authors: Chambers is a graduate student and Bae is a postdoctoral scholar under faculty peer Kirisits' supervision at UT; Afrooz and Aich are graduate students under my supervision; Katz is the other faculty peer at UT.
- Qualitative statement of contribution: This publication is a result of my collaborative work with Kirisits, while I was at University of South Carolina. The paper was published after my arrival at UT. I have provided intellectual leadership and guidance on this work and my group had an equal contribution to Kirisits'.

Saleh, N. B., Caicedo, J. M., Johnson, A., Afrooz, A. R. M. N., Khan, I. A. (2014). Nano in a Global Context: Modular Course Design with Integrated Ethics Improves Core Knowledge in Nanotechnology. *Journal of Nano Education. 6 (2)*, 124-131. DOI: 10.1166/jne.2014.1057.

- Co-authors: Caicedo and Johnson are faculty peers at University of South Carolina; Afrooz and Khan are graduate students under my supervision.
- Qualitative statement of contribution: I have led this study and wrote the manuscript with Johnson. The results on active learning pedagogical exercise at University of South Carolina were published here. Caicedo and the graduate students provided intellectual contribution to the article.

Aich, N., Boateng, L. K., Flora, J. R. V., Saleh, N. B. (2013). Preparation of Non-Aggregating Aqueous Fullerenes in Highly Saline Solutions with A Biocompatible Non-Ionic Polymer. *Nanotechnology. 24 (39)*, 395602, 1-10. DOI: 10.1088/0957-4484/24/39/395602.

- Co-authors: Aich is a graduate student under my supervision; Boateng is a graduate student at University of South Carolina (USC) under faculty peer Flora's supervision.
- Qualitative statement of contribution: Aich and I have designed the study and have written the manuscript. The graduate student and faculty peer at USC performed molecular modeling.

Khan, I. A., Aich, N., Afrooz, A. R. M. N., Flora, J. R. V., Schierz, P. A., Ferguson, P. L., Sabo-Attwood, T., Saleh, N. B. (2013). Fractal Structures of Single-Walled Carbon Nanotubes in Biologically Relevant Conditions: Role of Chirality vs. Media Conditions. *Chemosphere. 93 (9)*, 1997-2003. DOI: 10.1016/j.chemosphere.2013.07.019.

- Co-authors: Khan, Aich, and Afrooz are graduate students under my supervision; Faculty peers Flora at University of South Carolina. Schierz is a postdoctoral scholar at UT; other faculty peers: Ferguson at Duke University; Sabo-Attwood at University of Florida.
- Qualitative statement of contribution: I have designed the study with my graduate students. The manuscript was mostly written by my students, while I provided intellectual and editorial mentorship and significantly contributed in the analyses. The faculty peers provided intellectual contribution. The postdoctoral scholar contributed in sample preparation.

Khan, I. A., Berge, N. D., Sabo-Attwood, T., Ferguson, P. L., Saleh, N. B. (2013). Single-Walled Carbon Nanotube Transport in Representative Municipal Solid Waste Landfill Conditions. *Environmental Science & Technology. 47 (15)*, 8425-8433. DOI: 10.1021/es401748f.

- Co-authors: Khan is a graduate student under my supervision; Faculty peers Berge at University of South Carolina; Sabo-Attwood at University of Florida; Ferguson at Duke University.
- Qualitative statement of contribution: I have designed the study with my graduate student. The manuscript was mostly written by my student, while I provided intellectual and editorial mentorship and significantly contributed in the analyses. The faculty peers provided intellectual contribution. Berge was closely involved in the design as well as a faculty peer.

Schrand, A. M., Lin, J. B., Garrett, C. M., Brownheim, S. V., Hussain, S. M., Cubadda, F., Afrooz, A. R. M. N., Saleh, N. B. (2013). Nanoparticle Dynamics in the Presence and Absence of a Cellular Uptake Altering Chemical. *Il Nuovo Cimento C, 36* (2), 117-129. DOI: 10.1393/ncc/i2013-11516-4.

- Co-authors: Schrand is a professional peer at US Air Force Laboratory at Elgin, FL; Lin and Garrett are professional peers at US Air Force Laboratory at Wright Patterson Air Force Base; Brownheim is a professional peer at Air Force Institute of Technology; Hussain is a professional peer at US Air Force Laboratory, Wright Patterson Air Force Base; Cubadda is a faculty peer at Instituto Superiore di Sanit`a, Italy; Afrooz is a graduate student under my supervision.
- Qualitative statement of contribution: I have provided intellectual contribution and data analyses for this study. My group's contribution in this study was to decipher toxicological mechanism by performing physicochemical characterization of the nanomaterials; a key aspect in any nanotoxicological publication. Schrand led this work.

Aich, N., Appalla, A., Saleh, N. B., Ziehl, P. (2013). Triboluminescence for Distributed Damage Assessment in Cement-Based Materials. *Journal of Intelligent Material Systems and Structures. 24 (14)*, 1714-1721. DOI: 10.1177/1045389X13484100.

- Co-authors: Aich is a graduate student under my supervision; Appalla is a graduate student under faculty peer Ziehl's supervision at University of South Carolina.
- Qualitative statement of contribution: I have designed the study with Aich. The study was performed and the manuscript was mostly written by Aich, while I provided intellectual and editorial mentorship and significantly contributed in analyses. Ziehl and his group provided intellectual contribution.

Khan, I. A., Afrooz, A. R. M. N., Flora, J. R. V., Schierz, P. A., Ferguson, P. L., Sabo-Attwood, T., Saleh, N. B. (2013). Chirality Affects Aggregation Kinetics of Single-Walled Carbon Nanotubes. *Environmental Science & Technology. 47 (4)*, 1844-1852. DOI: 10.1021/es3030337.

- Co-authors: Khan and Afrooz are graduate students under my supervision; Flora is a faculty peer at University of South Carolina; Schierz is a postdoctoral scholar at UT; other faculty peers: Ferguson at Duke University; Sabo-Attwood at University of Florida.
- Qualitative statement of contribution: I have designed the study with my graduate students Khan and Afrooz. The entire manuscript was written by my students, while I provided intellectual and editorial mentorship. The faculty peers provided intellectual contribution. The postdoctoral scholar contributed in sample preparation.

Afrooz, A. R. M. N., Khan, I. A., Hussain, S. M., Saleh, N. B. (2013). Mechanistic Heteroaggregation of Gold Nanoparticles in a Wide Range of Solution Chemistry. *Environmental Science & Technology. 47 (4)*, 1853-1860. DOI: 10.1021/es3032709.

- Co-authors: Afrooz and Khan are graduate students under my supervision; Hussain is a professional peer at US Air Force Laboratory.
- Qualitative statement of contribution: I have designed the study with my graduate students Afrooz and Khan. The entire manuscript was written by my students, while I provided intellectual and editorial mentorship. The professional peer provided intellectual contribution.

Afrooz, A. R. M. N., Sivalapalan, S. T., Murphy, C. J., Hussain, S. M., Schlager, J. J., Saleh, N. B. (2013). Spheres vs. Rods: The Shape of Gold Nanoparticles Influences Aggregation and Deposition Behavior. *Chemosphere. 91 (1)*, 93-98. DOI: 10.1016/j.chemosphere.2012.11.031.

- Co-authors: Afrooz is a graduate student under my supervision; Sivalapalan is a graduate student under faculty peer Murphy's supervision at University of Illinois; Hussain and Schlager are professional peers at US Air Force Laboratory.
- Qualitative statement of contribution: I have designed the study with my graduate student Afrooz. The entire manuscript was written by my student, while I provided intellectual and editorial mentorship. Sivalapalan contributed in sample preparation and Murphy provided intellectual contribution. The professional peers also provided intellectual contribution.

Zhang, W., Zhao, S., Rao, W., Snyder, J., Choi, J. K., Wang, J., Khan, I. A., Saleh, N. B., Mohler, P. J., Yu, J., Hund, T. J., Tang, C., and He, X. (2013). A Novel Core-Shell Microcapsule for Encapsulation and 3D Culture of Embryonic Stem Cells. *Journal of Materials Chemistry B. 1*, 1002-1009. DOI: 10.1039/C2TB00058J.

- Co-authors: Zhang and Zhao are graduate students, Rao is a research staff, Snyder is a graduate student, Choi is a postdoctoral scholar at Ohio State University; Wang is a graduate student at University of South Carolina; Khan is a graduate student under my supervision; Mohler, Yu, Hund, and He are faculty peers at Ohio State University; Tang is the other faculty peer at University of South Carolina.
- Qualitative statement of contribution: I have provided intellectual contribution and data analyses for this study. My group's contribution in this study was to analyze nano-bio interaction via physicochemical characterization of nanomaterials. He's group at Ohio State University led this work.

Aich, N., Zohhadi, N., Khan, I. A., Matta, F., Ziehl, P., Saleh, N. B., (2012). Applied TEM Approach for Micro/Nanostructural Characterization of Carbon Nanotube Reinforced Cementitious Composites. *Journal of Research Updates in Polymer Science. 1 (1)*, 14-23. ISSN: 1929-5995.

- Co-authors: Aich and Khan are graduate students under my supervision; Zohhadi is a graduate student under faculty peer Matta's supervision at University of South Carolina; Ziehl is the other faculty peer at University of South Carolina.
- Qualitative statement of contribution: I have designed the study with Aich and Khan. The study was performed and the manuscript was mostly written by Aich, while I provided intellectual and editorial mentorship and significantly contributed in analyses. Matta and his group contributed in cementitious material preparation and Ziehl provided intellectual contribution.

Mukhopadhyay, A., Grabinski, C., Afrooz, A. R. M. N., Saleh, N. B., Hussain, S. M. (2012). Effect of Gold Nanosphere Surface Chemistry on Protein Adsorption and Cell Uptake in vitro. *Applied Biochemistry and Biotechnology. 167 (2)*, 327-337. DOI: 10.1007/s12010-012-9666-z.

- Co-authors: Mukhopadhyay is an undergraduate student and Grabinski is a graduate student at Wright State University who worked in US Air Force Laboratory at Wright Patterson Air Force Base during this study; Afrooz is a graduate student under my supervision; Hussain is professional peer at US Air Force Laboratory.
- Qualitative statement of contribution: I have provided intellectual contribution and data analyses for this study. I have also had a major contribution in the manuscript writing and have mentored both Mukhopadhyay and Grabinski during this process. My group's contribution was also to analyze nano-bio interaction via physicochemical characterization of nanomaterials. Hussain's group at US Air Force Laboratory led this study.

Zaib, Q., Khan, I. A., Yoon, Y., Flora, J. R. V., Park, Y.-G., Saleh, N. B. (2012). Ultrasonication Study for Suspending Single-Walled Carbon Nanotubes in Water. *Journal of Nanoscience and Nanotechnology. 12 (5)*, 3909-3917. DOI: 10.1166/jnn.2012.6212.

- Co-authors: Zaib is a graduate student co-advised by faculty peer Yoon and I at University of South Carolina; Khan is a graduate student under my supervision; Flora is the other faculty peer at University of South Carolina; Park is a professional peer at Goldstar Engineering and Construction (GS E &C), South Korea.
- Qualitative statement of contribution: I have designed the study with Zaib and Khan. The study was performed and the manuscript was mostly written by Zaib, while I provided intellectual and editorial mentorship and significantly contributed in analyses. The faculty and professional peers provided intellectual contribution.

Zaib, Q., Khan, I. A., Saleh, N. B., Flora, J. R. V., Park, Y.-G., Yoon, Y. (2012). Removal of Bisphenol A and 17-beta-Estradiol by Single-Walled Carbon Nanotubes in Aqueous Solution: Adsorption and Molecular Modeling. *Water, Air, and Soil Pollution. 223 (6)*, 3281-3293. DOI: 10.1007/s11270-012-1109-5.

- Co-authors: Zaib is a graduate student co-advised by faculty peer Yoon and I at University of South Carolina; Khan is a graduate student under my supervision; Flora is the other faculty peer at University of South Carolina; Park is a professional peer at Goldstar Engineering and Construction (GS E &C), South Korea.
- Qualitative statement of contribution: I have designed the study with faculty peer Yoon and graduate students Zaib and Khan. The study was performed and the manuscript was mostly written by Zaib, while I provided intellectual and editorial mentorship and significantly contributed in analyses. The faculty and professional peers provided intellectual contribution.

Schaeublin, N. M., Braydich-Stolle, L. K., Maurer, E. I., Park, K., MacCuspie, R. I., Afrooz, A. R. M. N., Vaia, R. A., Saleh, N. B., Hussain, S. M. (2012). Does Shape Matter? Bioeffects of Gold Nanomaterials in a Human Skin Cell Model. *Langmuir. 28 (6)*, 3248-3258. DOI: 10.1021/la204081m.

- Co-authors: Schaeublin, Braydich-Stolle, and Maurer are research staff at US Air Force Laboratory at Wright Patterson Air Force Base; Park is a professional peer at US Air Force Laboratory; MacCuspie is a professional peer at National Institute of Standards and Technology; Afrooz is a graduate student under my supervision; Vaia and Hussain are professional peers at US Air Force Laboratory.
- Qualitative statement of contribution: I have provided intellectual contribution and data analyses for this study. I have also had a major contribution in the manuscript writing and have mentored Schaeublin extensively. My group's contribution was also to analyze nano-bio interaction via physicochemical characterization of nanomaterials. Hussain's group at US Air Force Laboratory led this study.

Aich, N., Flora, J. R. V., Saleh, N. B. (2012). Preparation and Characterization of Stable Aqueous Higher Order Fullerene. *Nanotechnology. 23 (5)*, 055705, 1-9. DOI: 10.1088/0957-4484/23/5/055705.

- Co-authors: Aich is a graduate student under my supervision; Flora is a faculty peer at University of South Carolina.
- Qualitative statement of contribution: I have designed the study with Aich. The study was performed and the manuscript was mostly written by Aich, while I provided intellectual and editorial mentorship and significantly contributed in analyses. The faculty peer provided intellectual contribution.

Philbrook, N. A., Winn, L. M., Afrooz, A. R. M. N., Saleh, N. B., Walker, V. K. (2011). The Effect of TiO_2 and Ag Nanoparticles on Reproduction and Development of Drosophila Melanogaster and CD-1 mice. *Toxicology and Applied Pharmacology. 257 (3)*, 429-436. DOI: 10.1016/j.taap.2011.09.027.

- Co-authors: Philbrook is a graduate student at Queen's University; Winn is a faculty peer at Queen's University; Afrooz is a graduate student under my supervision; Walker is a faculty peer at Queen's University.

- Qualitative statement of contribution: I have provided intellectual contribution and data analyses for this study. My group's contribution was also to analyze nano-bio interaction via physicochemical characterization of nanomaterials. Walker and Winn led this study.

Philbrook, N. A., Walker, V. K., Afrooz, A. R. M. N., Saleh, N. B., Winn, L. M. (2011). Investigating the Effects of Functionalized Carbon Nanotubes on Reproduction and Development in Drosophila Melanogaster and CD-1 Mice. *Reproductive Toxicology. 32 (4)*, 442-448. DOI: 10.1016/j.reprotox.2011.09.002.

- Co-authors: Philbrook is a graduate student at Queen's University; Walker is a faculty peer at Queen's University; Afrooz is a graduate student under my supervision; Winn is a faculty peer at Queen's University.
- Qualitative statement of contribution: I have provided intellectual contribution and data analyses for this study. My group's contribution was also to analyze nano-bio interaction via physicochemical characterization of nanomaterials. Walker and Winn led this study.

Joseph, L., Zaib, Q., Khan, I. A., Berge, N. D., Park, Y.-G., Saleh, N. B., Yoon, Y. (2011). Removal of Bisphenol A and 17a-Ethinyl Estradiol from Landfill Leachate Using Single-Walled Carbon Nanotubes. *Water Research. 45 (13)*, 4056-4068. DOI: 10.1016/j.watres.2011.05.015.

- Co-authors: Joseph is an undergraduate student at University of South Carolina; Zaib (co-advised by Yoon) and Khan are graduate students under my supervision; Berge is a faculty peer at University of South Carolina; Park is a professional peer at Goldstar Engineering and Construction (GS E &C), South Korea; Yoon is a faculty peer at University of South Carolina.
- Qualitative statement of contribution: I have contributed in the design of the study with faculty peer Yoon. The study was performed and the manuscript was mostly written by Joseph, while I provided intellectual and editorial mentorship. Khan provided guidance to Joseph and also performed nanomaterial preparation. The faculty and professional peers provided intellectual contribution.

Surdo, E. M., Khan, I. A., Choudhury, A. A., Saleh, N. B., Arnold, W. A. (2011). Barrier Properties of poly(vinyl alcohol) Membranes Containing Carbon Nanotubes or Activated Carbon. *Journal of Hazardous Materials. 188 (1-3)*, 334-340. DOI: 10.1016/j.jhazmat.2011.01.130.

- Co-authors: Surdo is a graduate student at University of Minnesota; Khan is a graduate student under my supervision; Choudhury is an undergraduate student at Vanderbilt University who worked under my supervision during a summer internship; Arnold is a faculty peer at University of Minnesota.
- Qualitative statement of contribution: This publication is a result of my collaborative work with Arnold at University of Minnesota. I have provided intellectual leadership and guidance on this work and my group had an equal contribution to Arnold's.

Saleh, N. B., Pfefferle, L. D., Elimelech, M. (2010). Influence of Biomacromolecules and Humic Acid on the Aggregation Kinetics of Single-Walled Carbon Nanotubes. *Environmental Science & Technology. 44 (7)*, 2412-2418. DOI: 10.1021/es903059t.

- Co-authors: Pfefferle and Elimelech are faculty mentors at Yale University.

- Qualitative statement of contribution: I am the lead author of this paper and have designed and performed the study. This publication is a partial result of my work during my tenure as a postdoctoral scholar at Yale University. The article was written and data analyses were performed while in rank at University of South Carolina.

Brady-Estevez, A. S., Schnoor, M. H., Vecitis, C. D., Saleh, N. B., Elimelech, M. (2010). Multiwalled Carbon Nanotube Filter: Improving Viral Removal at Low Pressure. *Langmuir. 26 (18)*, 14975-14982. DOI: 10.1021/la102783v.

- Co-authors: Brady-Estevez and Schnoor are graduate students and Vecitis is a postdoctoral scholar (at that time) at Yale University under faculty mentor Elimelech's supervision.
- Qualitative statement of contribution: I am a co-author of this paper and have performed experimentation during my tenure as a postdoctoral scholar at Yale University. The article was written and data analyses were performed while in rank at University of South Carolina.

Section 3. Works published (or in equivalent status) while in previous rank(s) at UT Austin

Not applicable.

Section 4. Works published (or in equivalent status) while in previous ranks: postdoctoral scholar at Yale University and Graduate student at Carnegie Mellon University

Sirk, K. M., Saleh, N. B., Phenrat, T., Kim, H.-J., Dufour, B., Ok, J., Golas, P. L., Matyjaszewski, K., Lowry, G. V., Tilton, R. D. (2009). Effect of Adsorbed Polyelectrolytes on Nanoscale Zero Valent Iron Particle Attachment to Soil Surface Models. *Environmental Science & Technology. 43 (10)*, 3803-3808. DOI: 10.1021/es803589t.

Veronesi, B., Tajuba, J., Saleh, N., Ward, W., Hester, S., Carter, J., Lowry, G. V. (2008). Functionally Charged Polystyrene Particles Activate Immortalized Mouse Microglia (BV2): Cellular and Genomic Response. *Nanotoxicology. 2 (3)*, 130-143. DOI: 10.1080/17435390802296347.

Saleh, N. B., Pfefferle, L. D., Elimelech, M. (2008). Aggregation Kinetics of Multiwalled Carbon Nanotubes in Aquatic Systems: Measurements and Environmental Implications. *Environmental Science & Technology. 42 (21)*, 7963-7969. DOI: 10.1021/es801251c.

Saleh, N., Kim, H.-J., Phenrat, T., Matyjaszewski, K., Tilton, R. D., Lowry, G. V. (2008). Ionic Strength and Composition Affect the Mobility of Surface-Modified Fe-0 Nanoparticles in Water-Saturated Sand Columns. *Environmental Science & Technology. 42 (9)*, 3349-3355. DOI: 10.1021/es071936b.

Phenrat, T., Saleh, N., Sirk, K., Kim, H.-J., Tilton, R. D., Lowry, G. V. (2008). Stabilization of Aqueous Nanoscale Zerovalent Iron Dispersions by Anionic Polyelectrolytes: Adsorbed Anionic Polyelectrolyte Layer Properties and Their Effect on Aggregation and Sedimentation. *Journal of Nanoparticle Research.10 (5)*, 795-814. DOI: 10.1007/s11051-007-9315-6.

Jaisi, D. P., Saleh, N. B., Blake, R. E., Elimelech, M. (2008). Transport of Single-Walled Carbon Nanotubes in Porous Media: Filtration Mechanisms and Reversibility. *Environmental Science & Technology. 42 (22)*, 8317-8323. DOI: 10.1021/es801641v.

Saleh, N., Sirk, K., Liu, Y., Phenrat, T., Dufour, B., Matyjaszewski, K., Tilton, R. D., Lowry, G. V. (2007). Surface Modifications Enhance Nanoiron Transport and NAPL Targeting in Saturated Porous Media. *Environmental Engineering Science. 24 (1)*, 45-57. DOI: 10.1089/ees.2007.24.45.

Phenrat, T., Saleh, N., Sirk, K., Tilton, R. D., Lowry, G. V. (2007). Aggregation and Sedimentation of Aqueous Nanoscale Zerovalent Iron Dispersions. *Environmental Science & Technology. 41 (1)*, 284-290. DOI: 10.1021/es061349a.

Long, T. C., Tajuba, J., Sama, P., Saleh, N., Swartz, C., Parker, J., Hester, S., Lowry, G. V., Veronesi, B. (2007). Nanosize Titanium Dioxide Stimulates Reactive Oxygen Species in Brain Microglia and Damages Neurons in vitro. *Environmental Health Perspectives. 115 (11)*, 1631-1637. DOI: 10.1289/ehp.10216.

Long, T. C., Saleh, N., Tilton, R. D., Lowry, G. V., Veronesi, B. (2006). Titanium Dioxide (P25) Produces Reactive Oxygen Species in Immortalized Brain Microglia (BV2): Implications for Nanoparticle Neurotoxicity. *Environmental Science & Technology. 40 (14)*, 4346-4352. DOI: 10.1021/es060589n.

Saleh, N., Sarbu, T., Sirk, K., Lowry, G. V., Matyjaszewski, K., Tilton, R. D. (2005). Oil-in-Water Emulsions Stabilized by Highly Charged Polyelectrolyte-Grafted Silica Nanoparticles. *Langmuir. 21 (22)*, 9873-9878. DOI: 10.1021/la050654r.

Saleh, N., Phenrat, T., Sirk, K., Dufour, B., Ok, J., Sarbu, T., Matyjaszewski, K., Tilton, R. D., Lowry, G. V. (2005). Adsorbed Triblock Copolymers Deliver Reactive Iron Nanoparticles to the Oil/Water Interface. *Nano Letters. 5 (12)*, 2489-2494. DOI: 10.1021/nl0518268.

Wednesday, July 27, 2016 at 12:43:24 PM Central Daylight Time

Subject: Your Submission
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To: Saleh, Navid
CC: Milliron, Delia, nirupamaich@utexas.edu, Katz, Lynn E, Liljestrand, Howard M, Kirisits, Mary J

Ms. Ref. No.: STOTEN-D-15-03501R1
Title: Importance of Doping, Dopant Distribution, and Nano-Scale Defects on Electronic Band Structure Alteration of Metal Oxide Nanoparticles: Implications for Reactive Oxygen Species
Journal: Science of the Total Environment

Dear Prof. Navid B Saleh,

I am pleased to inform you that your paper "Importance of Doping, Dopant Distribution, and Nano-Scale Defects on Electronic Band Structure Alteration of Metal Oxide Nanoparticles: Implications for Reactive Oxygen Species" has been accepted for publication in STOTEN and forwarded to the publishers.

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Teaching Assessment

Budget Council Assessment for Dr. Saleh

Prepared by Budget Council Members: Drs. Lynn E. Katz and Desmond F, Lawler

This assessment is based on peer evaluations of Dr. Saleh's teaching, results from course instructor surveys, the teaching statement supplied as part of his promotion package, and information provided in his CV relevant to course development.

Dr. Saleh has taught three different courses during his pre-tenure period at the University of Texas: one required undergraduate course in the civil engineering program (CE341: Introduction to Environmental Engineering, one undergraduate elective that he developed (CE377K, Designing Sustainable Nanomaterials) and one graduate course that he also developed while at the University of Texas (CE397: Environmental Implications of Nanomaterials). He has had a total of 194 students in his classes while teaching CE341 three times, CE377K one time, and CE397 twice. His overall average instructor rating (IR) is 4.45 and overall average course rating (CR) is 4.05 for undergraduate courses, and his overall graduate ratings are 4.30 and 4.10 for instructor and course evaluations, respectively. These numbers compare favorably to instructor ratings for CAEE (4.48 for UG; 4.43 for Grad) and CSE (4.17 for UG; 4.34 for Grad). In addition, they compare favorably to the average course evaluation for CAEE and CSE.

Dr. Saleh's teaching performance is consistent with his previous performance at the University of South Carolina in which he taught five different courses: Introduction to Environmental Engineering (ECIV 350) once, Elements of Water and Wastewater Treatment (ECIV 551) four times, Environmental Engineering Process Modeling (ECIV 558) twice, Nano in a Global Context (ENCP 460) twice and Principles of Environmental Engineering Processes (ECIV 750) twice. His instructor evaluations, both numerical scores and student comments, were consistent with his performance at UT, and the average course and instructor ratings were typically well above the department and college average. The only ranking below 4.0 was his average course ranking for the first offering of Nano in a Global Context. Thus, Dr. Saleh has been a strong teacher throughout his academic career.

Dr. Saleh's performance in CE341 (IR = 4.40, CR = 4.03) is comparable to the other two faculty members who have been regularly teaching this course for over ten years, Dr. Kinney (average IR = 4.60, CR = 4.27 for the past three years) and Dr. Kirisits (average IR = 4.37, CR = 3.97 for the past three years). All three instructors utilize the same basic set of power point slides and update them regularly. Dr. Saleh's evaluations in the course have steadily improved each of the three years at UT from an instructor rating of 4.1 in his first semester to 4.8 in Spring, 2016. Each year students comment about his passion, enthusiasm, concern, humor and the clarity of his lectures and explanations. For example, in Spring 2014, one student wrote, "*Professor Saleh took a very concentrated effort in ensuring student's success.*" Another student wrote, "*Great teacher of the material. Really gets the points across in a relatable manner. Exciting and engaging person. Very easy to talk to and flexible outside of class.*" In Spring 2015 and Spring 2016, numerous comments highlighted his concern for student learning. There were also many comments that highlighted his ability to explain concepts including, "*Overall fantastic lecture style. He explained material very clearly and made sure we understood before moving on,*" "*He*

makes this potentially boring info so engaging and exciting.....UT Engineering is lucky to have him and the students who take his class are luckier. He rocks!" and "*Great job! Really enjoyed the course and your method of explanation.*"

Negative comments from students across the three years focused primarily on the pace of lectures, and several suggested that he speak slower. One comment that highlights this concern came from a student who wrote, "*Sometimes it's hard to keep up in lecture because you talk really fast. Then you ask if we understand but I feel like we don't have time to even absorb enough to know whether we understand. It's like a 1.25 hour marathon.*" In addition, several students suggested that the exams be returned more promptly. There were also two comments that he was not available for office hours and one of those two students felt that they were bothering him when he was there. However, that statement was in stark contrast to the numerous comments about his helpfulness and availability.

Peer reviews of CE341 were conducted each semester he taught the course and each of the reviewers praised his lecturing skill. Dr. Zornberg wrote, "*It was very clear that Dr. Saleh was very comfortable with the material and that he was attentive to the student response throughout the class. Students in the audience showed genuine interest in the presented material and the class seemed to be learning from each presentation. The students seemed very comfortable with Dr. Saleh....I believe that Dr. Saleh is a very skillful teacher.*" Similar comments were made by Dr. Folliard in 2015 who highlighted his ability "*to build the concepts slowly with good direction and vision.*" While Dr. Engelhardt's comments were also very positive, he also noted that his high energy resulted in speaking "*sometimes a bit too fast for students to keep up.*"
Dr. Saleh indicated in his teaching statement that in Spring 2016 he was able to address the issue with the pace of his lectures by stopping and highlighting key points on the board. In 2016, only one of the students commented about the pace of the course.

Undergraduate and Graduate Courses in Nanotechnology

While Dr. Saleh's ability to teach core concepts in required courses is evident from his student and peer evaluations, where he has truly excelled is in the development of courses that bring state-of-the-art concepts and technologies to the classroom. Both at the University of South Carolina and at the University of Texas, he has led efforts to secure NSF funding to develop nanotechnology based courses. At the University of South Carolina, he developed and taught a course titled Nano in a Global Context. He utilized innovative problem-based and active learning tools to develop this course on nanotechnology. This course focused on the use of nanomaterials in water treatment applications. At the University of Texas, he worked with two other faculty members (Kirisits in CAEE and Korgel in ChE) and led the development of a second NSF-funded curriculum that contained two courses, a problem-based nano course that was more innovative than the one at South Carolina and a lab-based nano course. According to Dr. Saleh, "*the focus is to teach nano-scale fundamentals in the context of sustainable use of nanomaterials. The problem-based modules are more rigorous and quantitative and the active learning exercises are also more innovative than the previous course.*" Moreover, the inclusion of video discussions with Professor Michael Gorman from the University of Virginia on the social and ethical implications of nanotechnology is also noteworthy and highlights Dr. Saleh's broad educational vision for his students.

Reviews of the undergraduate and graduate nanotechnology courses were consistent with the comments from CE341. He received high marks (Instructor = 4.6, Course = 4.1) from his class which he only taught once. One student from CE377K commented, "*Dr. Saleh is a very good lecturer. He explains concepts well and is very engaging.*" Peer reviewer Carlos Caldas summarized, "*Dr. Saleh did a very good job on his teaching. ... His presentation of concepts and techniques on the white-board was well-organized and clear. Throughout the lecture, Dr. Saleh showed a positive attitude and demonstrated that he cares about the students.*" Dr. Caldas also offered constructive criticism focused on ways to enhance student's ability to understand topic details. He stated, "*The use of visual aids, examples and exercises may also help the achievement of the lecture objectives.*" Students also provided some constructive criticism including, "*This class was broad and interesting in the way it covered topics from ethics to biology and material science; however, I believe it could have been better organized and requirements better communicated.*"

The graduate course, CE397 Environmental Implications of Nanomaterials, that Dr. Saleh developed at the University of Texas was taught twice. The student evaluations were positive (IR = 4.7, CR = 4.3 in Fall 14 and IR = 3.9, CR = 3.9 in Fall 15) and highlighted his enthusiasm, but the comments were quite varied with some students asking for "more quantum mechanics and thermodynamic fundamentals" and others indicating "that the material incorporated theory well into a cutting edge research area." The rapid pace and excessive amount of material presented in a single lecture was also a concern that was noted.

Graduate Supervision

Finally, while in rank at The University of Texas at Austin, 2 Ph.D. students have graduated under Dr. Saleh's direction and one Ph.D. student graduated under his direction at the University of South Carolina. One of his former UT students is an assistant professor at SUNY-Buffalo and the other is a post-doc at Stanford University. He also has four current Ph.D. students in progress (three sole-supervised). In addition, he graduated two M.S. students (1 sole supervised, 1 co-supervised) at the University of Texas and he is currently supervising 3 M.S. students (2 sole supervised).

Summary

Dr. Saleh is a clearly a skilled, innovative, passionate and caring teacher. He invests considerable effort to ensure that all of the students in his classes understand concepts. He has sought out and obtained NSF funding to develop new courses in nanotechnology. His interest in pedagogy is exemplified by some of the innovative strategies he has used in his classes. Finally, he has become an integral member of the curriculum development for the new environmental engineering degree program that will begin in 2017.

Teaching Statement

Navid Saleh

Teaching is my passion and has been the life-blood of my career. The various challenges that face an assistant professor are easily swept away when I walk into a classroom and see the faces of the next generation of engineers. My passion for teaching is summed up in the following comment from one of my students in CE 341: "*Dr. Saleh is one of my favorite professors I have had at UT. His enthusiasm is refreshing and contagious. I really appreciate when my teachers really care about the class and the students, and Dr. Saleh does both*". My dedication toward teaching is reflected not only through the student evaluations of the courses I have taught but also through National Science Foundation (NSF) funded projects that allow for innovation in teaching. I believe in continuous improvement of my teaching style and course materials. My students are the sources of feedback, and they have made me a better teacher.

During my five semesters at the University of Texas at Austin (UT) I have taught two undergraduate courses: CE 341 (Introduction to Environmental Engineering) and CE 377K (Designing Sustainable Nanomaterials) and one graduate course: CE 397 (Environmental Implications of Nanomaterials). I have adopted and modified the course materials for CE 341. CE 377K and CE 397 are two new courses that I have developed after my arrival at UT. The content of the undergraduate courses ranges from classical environmental engineering principles to cutting edge material science and engineering concepts at the nano-scale.

During my teaching career, I have realized that there are four common over-arching learning objectives in all the engineering courses that I have taught. These objectives are core knowledge development, critical thinking to attain metacognition, exposure to contemporary issues, and ability to express oneself or presentation skills. Over the years I have tuned my teaching style to fulfill these learning objectives in each of the courses I teach. The remainder of this document describes my teaching philosophy, innovation in teaching, challenges and accomplishments in teaching, and my future plans to enhance engineering education at UT.

Teaching Philosophy

My philosophy is not only to deliver the material to a class but also to ensure that the students understand the concepts and can relate them to a larger context. In traditional engineering courses, I use a structured format for each set of concepts. In CE 341, for example, I begin the topic of mass transfer with a schematic of the natural environment and describe how environmental engineers simplify this model environmental system into a three-compartment (i.e., air, water, and soil) model. Then I teach them the theories and concepts of air-water transfer, soil-water partitioning (adsorption), and continue to bring back the schematic to show them where and how these concepts fit into the picture. The students then solve a real-life chemical fate and transport problem, where they use these mass transfer concepts, but with a much higher degree of understanding of the problem. My students have stated that this approach has improved their understanding dramatically. One of my students from the Spring 2015 CE 341 class states, "*He is very engaging and ties in what we're learning to past and current events, which emphasizes the importance of the material.*"

At the graduate level, my philosophy is to equip the students with a toolset that they can employ to further their research. I believe a course with a strong foundation of fundamental concepts can be extremely beneficial. Also, the graduate students should be taken to the edge of current knowledge, from where they can explore and discover new knowledge in the future. I

have developed the CE 397 course, the first graduate course in nano-environmental implications at UT, with attention to fundamentals and to identifying the knowledge horizon for nano-environmental engineering. Nearly 200 pages of handwritten class notes with theoretical concepts, problems, and derivation have been prepared and disseminated to my students. This course is one of the few (if not the only one) in the field that attempts to lay down a foundation of nano-scale concepts that are applicable to environmental engineering.

Innovation in Teaching

During the seven years that I have been teaching, I have realized that students find it challenging to relate their acquired learning to the solution of real-life engineering problems. This might be a result of the Grinter Report of 1956, which emphasized fundamentals compared to hands-on training (common in the pre-1950s) in engineering education. Bringing hands-on training back to engineering curricula has been realized through the efforts of the NSF and the National Academy of Engineering (NAE), which prompted the establishment of multiple engineering education coalition programs in the late 1980s and publication of the relatively recent report of NAE on *Educating the Engineer of 2020: Adapting Engineering Education to the New Century*. One of the NAE's key recommendations was to foster student learning using iterative engineering design with the ability to predict system or device performance—'the essence of engineering'. Achieving these education goals necessitates the use of problem-based meta-cognitive learning to keep the 'reality-check' in place.

I have developed one of the first nano-environmental engineering undergraduate courses (CE 377K) that utilizes problem-based learning techniques to achieve meta-cognition. The format of the course is innovative. During the initial 3 weeks, the students get exposed to new physics, chemistry, and biology concepts at the nano-scale. The rest of the semester is structured in three problem-based learning modules to render meta-cognition (critical awareness of one's knowledge and thinking) on the concepts. Each module begins with a driving design question to solve a real-life problem that the students attempt to answer in the first class. It gives them a realization that they are not equipped with the concepts and theories to solve it; however, they immediately start to think about the problem and gather concepts from their previous engineering courses. During the module, they learn about the concepts needed to solve the problem through active-learning exercises and lectures. For the nano-toxicity module, I developed an active-learning module in which students used Lego blocks to build a bacterium and a metal nanocrystal, which shed metal ions; this hands-on activity enhanced their understanding of the interaction between metal nanomaterials and bacteria.

Another innovative aspect of this course was my aim to integrate social and ethical implications of nanotechnology. One of the leading experts in the field, Professor Michael Gorman from the University of Virginia, electronically joined the class every Friday to lead a discussion of the social and ethical implications of this new technology. This aspect was much appreciated by the students, since they do not get enough exposure to social aspects and realities of technology. One of the students in CE 377K stated, "*…it was nice learning about nanotechnology from different experts.*"

Challenges and Accomplishments

Though my teaching style injects excitement into the class, it also comes with a significant challenge; i.e., fast pace of my delivery. Several students in my Spring 2014 CE 341 class brought this to my attention. As one of the students stated, "*Professor Saleh is great at*

explaining the course material, but tends to go a little fast." I was given similar feedback during my time at the University of South Carolina (USC). Thus, I tried to slow down my delivery; however, this did not work well because it goes against my natural delivery style. When students from the spring 2015 CE 341 class identified the persistence of this problem, I consulted with my senior colleagues to devise a solution. To preserve my natural teaching style, while helping students adjust to the pace of my delivery, I now write down the key points on the board after a discussion. In this way, a 5-min long oral delivery is summarized in a few bulleted items that the students can record in their notes. I tried this solution in spring 2016, and the associated student evaluations show that I have been quite successful in overcoming this challenge. Not a single student evaluation this year highlighted the fast delivery-pace as a negative teaching attribute.

My teaching has had a lasting impression on many of my students. A number of the students from CE 341 course signed up for the elective CE 377K nanomaterials course, that I have taught in Fall 2015. A few of them also expressed interest in pursuing research under my supervision. One such student is Rachel Piner (spring 2016 CE 341 student) who is going to start undergraduate research in my laboratory next semester. Exciting students about their profession and raising their interest level in research is my highest teaching accomplishment. Students are continuing to show interest in my teaching. I am aware of a number of my CE 341 students from Spring 2016 semester, who will be taking the nanomaterials course with me in Fall 2016.

Future Plans

The students learn many concepts during their four years of undergraduate engineering training, and in our department many struggle to link them together. To aid this, faculty often repeat concepts in courses that have been covered earlier, extensively in some instances. Based on my colleagues approval, I intend to lead an effort to prepare a 'concept map' for our department in the coming years. Here, I will identify the core engineering courses and interview the associated faculty to identify key concepts taught therein. The short-listed concepts then can be mapped for the 4-year degree programs in civil engineering, architectural engineering, and the newly developed environmental engineering.

In an effort to continue building critical thinking in our students, I will develop new problem-based learning modules and integrate these into the existing CE 341 course and new courses being developed for the environmental engineering program. One of my goals is to develop a module around the CAEE strategic vision. A module that integrates aspects of cities, water, and energy will not only be useful for my courses but can then be shared with interested faculty across the department.

We should make a concerted effort to make research available for a large number of students in our program. Exposure to research can be a valuable career learning experience. An undergraduate student-faculty congregation with posters and demonstrations of their research will likely generate excitement among our students. My idea is to organize such a congregation called the 'Meeting of the Minds'. Interested faculty can present their research in one semester and students can interact with them in an informal setting to exchange ideas and explore future opportunities. The next semester, undergraduate students themselves can present their research, and their peers and faculty can have an opportunity to interact and provide insight. An informal congregation as this will have higher likelihood to attract a larger number of undergraduates in research.

During the development of the undergraduate and graduate nanomaterials courses, I observed that there is no appropriate textbook that the students could follow. The carefully

developed course material can be a valuable resource for students at UT and elsewhere. One of my colleagues, Vicki Grassian at University of California, San Diego and I have prepared a book proposal, which is under review with John Wiley and Sons Inc. The goal of this text is to build and enhance student knowledge on a wide range of topics: synthesis, crystal structure, chemical and electronic (band gap) properties, surface properties (e.g., surface tension, surface pressure, adsorption of surfactants/polymers), environmental or occupational health implications (e.g., aggregation, deposition, transformation, toxicity), exposure, and risk. I plan to complete publishing this text within the next three years.

Real-life experiences can transform careers. I intend to involve both undergraduate and graduate students of UT in my education and outreach efforts at the Navajo Nation. During my tenure at USC, I traveled to the Navajo reservation with six undergraduate students. The visiting students had first-hand knowledge of uranium contamination from mining in the area. They also collected water samples and sent those for analysis to a professional laboratory. The results disclosed water quality issues at the Navajo Nation. This visit was inspiring to the undergraduate students, and five out of six of these students applied for an NSF Graduate Research Fellowship. I intend to utilize my relationship with the Navajo community and colleges in the region to give UT students this enhancing educational experience. I will use my NSF funds to fund the students during the first trip and later will apply to NSF for supplemental funding for such activities. Such interaction will enrich our students by providing them with a unique lens to look at real-life engineering problems.

In the future, I plan to continue developing innovative pedagogical methods. Interactive problem-based learning has been effective in my courses and many of my students have gained metacognition on the topics I have taught using this method. My efforts to enhance student exposure into social and ethical aspects of engineering and technology will continue to broaden our students' knowledge. I also believe that students are the mirror of a teacher's success. I aim to continuously improve my teaching by appropriately responding to their comments.

Navid Saleh
Department of CAEE
Course Rating Averages

Tenure candidates must include all years in rank.
All other candidates must include, at minimum, the three most recent years.
What source was used to complete this chart? _ My CIS
(e.g.. My CIS, summary provided by Provost's Office, etc.)

CE 341: Introduction to Environmental Engineering

Semester	Class Size	Number of Responses	Instructor Rating	Course Rating
Spring 14	63	49	4.1	3.8
Spring 15	61	44	4.3	3.9
Spring 16	41	34	4.8	4.4
Mean	**55**	**42**	**4.4**	**4.0**

CE 397: Environmental Implications of Nanomaterials

Semester	Class Size	Number of Responses	Instructor Rating	Course Rating
Fall 14	11	11	4.7	4.3
Fall 15	8	8	3.9	3.9
Mean	**10**	**10**	**4.3**	**4.1**

CE 377K: Designing Sustainable Nanomaterials

Semester	Class Size	Number of Responses	Instructor Rating	Course Rating
Fall 15	10	9	4.6	4.1
Mean	**10**	**9**	**4.6**	**4.1**

Summary of Recent (All Years In Rank) UT Austin Course-Instructor Survey Resul
Overall Course/Instructor Items

Semester	Course Number	Course Title	Enrollment		Instructor Averages*		College/School Averages**		
			No. of Students Enrolled on 12th Class Day	No. of Surveys Returned at End of Semester	Overall Instructor Rating Avg.	Overall Course Rating Avg.	Overall Instructor Rating Avg.	Overall Course Rating Avg.	No. Classes Surveyed
Spring 14	C E 341	INTRO TO ENVIRONMENTAL ENGR	63	49	4.1	3.8	N/A ***	N/A ***	N/A
Fall 14	C E 397	ENVIRONM IMPLIC OF NANO MATRLS	11	11	4.7	4.3	N/A ***	N/A ***	N/A
Spring 15	C E 341	INTRO TO ENVIRONMENTAL ENGR	61	44	4.3	3.9	N/A ***	N/A ***	N/A
Fall 15	C E 377K	DESIGNING SUSTAINABLE NANOMATE	10	9	4.6	4.1	N/A ***	N/A ***	N/A
Fall 15	C E 397	ENVIRONM IMPLIC OF NANO MATRLS	8	8	3.9	3.9	N/A ***	N/A ***	N/A
Spring 16	C E 341	INTRO TO ENVIRONMENTAL ENGR	41	34	4.8	4.4	N/A ***	N/A ***	N/A

*For the computation of the averages, points were assigned to student responses as follows:
Excellent = 5, Very Good = 4, Satisfactory = 3, Unsatisfactory = 2, Very Unsatisfactory = 1

**College/school averages are the average of class averages, based on all courses surveyed in the instructor's college or school during the academic year in which the course was taught.

***New CIS forms were implemented in the fall 2000 semester. The average rating on the overall course and instructor questions on the new Basic and Expanded forms have been found to be approximately 0.1 to 0.2 points lower than those ratings on the old Common form.

PEER EVALUATION OF TEACHING
Dr. Navid Saleh
CE 341 – Introduction to Environmental Engineering
March 8, 2016

Observation and Evaluation by
Michael D. Engelhardt

I attended Dr. Saleh's CE 341 class on Tuesday March 8, 2016 from 11am – 12:15pm in ECJ 6.406. CE 341 is a required class for undergraduates in the Civil Engineering degree program. Dr. Saleh is one of several faculty that teaches this course on a periodic basis.

Dr. Saleh started this class by reviewing upcoming activities, including upcoming homework assignments and group projects. He also briefly discussed a recent midterm exam, and explained he would be returning the exams at the end of this class period. His opening remarks were effective in getting the students "tuned in" on remembering where they are at in the course, and setting the stage for the day's lecture.

The topic of the day's lecture was Environmental Chemistry. Dr. Saleh was clearly well prepared for the lecture, which as very well organized. He provided an effective mix of basic theory combined with real-world examples that illustrated application of the theory. One of the examples he presented near the end of the class involved an actual investigation of the death of two young men due to chemical exposure, and the resulting legal actions and claims that followed. Dr. Saleh showed how the theory he presented in today's lecture could be used to determine the cause of death, and to refute the technical claims of one of the parties in the legal action. The was an extremely effective example tying what the students learned in class to an actual event.

Dr. Saleh's presentation style involved using both PowerPoint and the whiteboard simultaneously. Major concepts were on the PowerPoint slides, while more details were filled in by writing on the whiteboard. This was an effective presentation style, and kept the majority of students engaged and attentive through the class period. Dr. Saleh's writing on the whiteboard was clear, and his speaking was also very clear and easily heard and understood. Dr. Saleh actively encouraged discussion and questions. When students asked a question, he would often start his response with "Fantastic Question" and then proceed to answer the question. This appeared to be effective in encouraging students to ask questions. Dr. Saleh had a very positive rapport with the students.

Dr. Saleh showed a very high level of energy and enthusiasm in this lecture. This high energy sometimes resulted in Dr. Saleh speaking very fast, sometimes a bit too fast for students to keep up. When meeting with Dr. Saleh after his lecture, I suggested he consider slowing down just a little in the pace of his lecturing.

Overall, Dr. Saleh did an excellent job in this lecture, and he is clearly a very good teacher.

Date of observation: March 8, 2015
Date on which observation was discussed with Dr. Saleh: March 8, 2015
Date of this report: March 26, 2015

Michael D. Engelhardt
Dewitt C. Greer Centennial Professor
Department of Civil, Architectural and Environmental Engineering

Peer Teaching Evaluation Report – Dr. Navid Saleh

Name of Peer Evaluator: Dr. Carlos Caldas

Date of Classroom Observation: 10/26/2015

Date of Report: 2/10/2016

Date of Follow-up Mtg w/Instructor to Discuss Observation: 2/18/2016

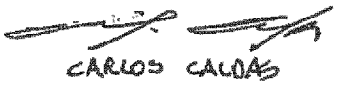
On October 26, 2015 I attended Navid Saleh's CE 377K Designing Sustainable Materials class at ECJ B.226. In preparation for the peer teaching evaluation, I reviewed the CE 377K syllabus, which allowed me to have a better understanding of the course objectives, format, and content. The main instructors of this course are Drs. Saleh and Kirisits. Other guest instructors teach some of the lectures throughout the semester. The course meets on Mondays, Wednesdays, and Fridays for a total of three hours per week. I have attended one of the 1-hour Monday sessions, which was attended by eleven students. The topic of the day was particle aggregation, which relates to a process that causes particles dispersed in the liquid phase to adhere to each other and form particle clusters.

Dr. Saleh started by providing an outline of the lecture using the whiteboard. The outline provided an organized framework of the material and set the stage for his presentation. The students appeared to be paying attention and enjoying the discussion. During the lecture, Dr. Saleh provided an overview of the particle aggregation process. Then, he explained several related concepts and techniques, such as the flocculation of uncharged particles, flocculation of charged particles, and origin of surface charge, among others. Towards, the end of the lecture, Dr. Saleh introduced electrokinetics and provided a summary of the topics to be discussed in the following lecture.

The presentation of the lecture material was very clear. Dr. Saleh outlined the key aspects of the particle aggregation process, which provided a broad view, and then he taught the related concepts. He asked questions to the class to stimulate discussion and make sure the students understood the material. Some students raised their hands to ask interesting questions and participate on the discussions. The breadth and depth of the questions demonstrated the students' comprehension of the topics presented. Each brought in different and good points that reflected what they had learned. Some students seemed to have knowledge on the topic and their insights contributed to getting students with less acquaintance to gain awareness as well.

Since one of the goals of the peer teaching assessment is to provide constructive feedback, I took notes during the lecture and thought about improvement suggestions. Even though Dr. Saleh did a very good job presenting the course material, the available lecture time did not allow for detailed explanations and step by step derivations of most equations presented. Considering the amount and depth of topics discussed in a short period of time, a suggestion would be to point out the details in the required textbook and/or other reference materials. This can facilitate the students' review and understanding of the material introduced in class. The use of visual aids, examples, and exercises may also help the achievement of the lecture objectives.

In summary, Dr. Saleh's did a very good job on his teaching . He began with an outline that built on previous class work and laid out a plan for the new material to be discussed. His presentation of concepts and techniques on the whiteboard was well-organized and clear. Throughout the lecture, Dr. Saleh showed a positive attitude and demonstrated that he cares about the students.



Peer Review of Navid Saleh's Teaching

Submitted by Kevin J. Folliard

December 10, 2015

On April 17, 2015, I attended Dr. Navid Saleh's lecture in CE 341 (Introduction to Environmental Engineering), as part of our department's peer teaching review. There were approximately 40-45 students in the lecture on this day. Dr. Saleh showed excellent command over the class from the beginning to the end. He actively engaged the students and showed enthusiasm and passion for the material being taught, which on this day related to the fate of pollutants in bodies of water. He started off with a concise and organized synopsis of concepts learned in the previous lecture(s) that were most relevant to the lecture he was planning to deliver. This exercise was very interactive, with several students enthusiastically participating and sharing their understanding of the key technical issues.

With this background in hand, Dr. Saleh segued into his primary lecture. He built the concepts slowly but with good direction and vision. He made great use of visuals and sought input throughout. It was a very engaging lecture that seemed to keep the vast majority of the students focused and interested throughout. Dr. Saleh showed a keen sense of humor, which the students really seemed to appreciate. But beyond that, he exhibited a very strong sense of knowledge and understanding – the students seemed to sense this mastery and realized that this faculty member was a genuine subject expert.

Overall, I was extremely impressed with Dr. Saleh as a teacher, especially in such a large, undergraduate class. He was able to keep the students actively engaged and interested from start to finish, he used humor and wit to keep the atmosphere upbeat, and he was able to methodically build his lecture both from a technical and practical perspective. I honestly believe that we are very fortunate to have Dr. Saleh on our faculty as he understands that being a great teacher is key to being a great department. I spoke with him after his lecture and provided my feedback to him, which was all positive. I had no significant suggestions or recommendations for improvement as his teaching on this day was excellent.

KJ Folliard

THE UNIVERSITY OF TEXAS AT AUSTIN

Jorge G. Zornberg, Ph.D., P.E.
Professor and William J. Murray, Jr. Fellow in Engineering
Department of Civil, Architectural and Environmental Engineering
The University of Texas at Austin
301 E. Dean Keeton St., Stop C1792
Austin, TX 78712-1174

Geotechnical Engineering Program
Room ECJ 9.227G
tel: (512) 232 3595
fax: (512) 471 6548
e-mail: zornberg@mail.utexas.edu
www.ce.utexas.edu/prof/zornberg

Peer Evaluation of Teaching: Dr. Navid Saleh
CE 341 Introduction to Environmental Engineering

Observation and Evaluation by :
Jorge G. Zornberg, Ph.D., P.E.
Professor, Department of Civil, Architectural and Environmental Engineering

Date of observation: 27 March 2014
Date on which observation was discussed with Dr. Saleh: 27 March 2014
Date of this report: 17 May 2014

I attended Dr. Saleh's class on Thursday, 27 March 2014, from 9:30 to 10:45 pm in ECJ 1.204. Well over fifty students were in attendance. The topic covered during this class was "Water Quality: Oxygen Demand." Dr. Saleh started the class with a brief review of the relevant material covered so far and the relevance of the topic to be covered in this class. The following observations can be made regarding the content and delivery of this class:

1. Dr. Saleh offered a very good introduction to the topic, providing good basis for its relevance and how this topic fits in the overall course.
2. He introduced the topic by presenting "Key Questions," which he subsequently covered throughout the class (e.g. "How Oxygen dissolves in Water?")
3. The structure of the class was excellent, and involved walking the students through the topic using a good combination of theoretical concepts, examples and worked out problems.
4. Dr. Saleh asked questions frequently to the class, with good response from the students. The students showed interest and were engaged during the class.
5. The closure of the class was particularly clear and presented the path forward on completing coverage of the topic.

It was very clear that Dr. Saleh was very well comfortable with the material and that he was attentive to the student response throughout the class. Students in the audience showed genuine interest in the presented material and the class seemed to be learning from each presentation. The students seemed very comfortable interacting with Dr. Saleh.

In terms of opportunities for improvement, an observation I made to Dr. Saleh was regarding the handling of the homework assignments that were due that day. Specifically, while students

were supposed to turn in the homework before class begins, those arriving late would continue to turn in their work, disrupting the initial portion of the class. While this problem is not uncommon, it was probably exacerbated by the large size and layout of the classroom. Dr. Saleh was very receptive to this observation and discussed options to minimize this issue.

Overall, this was a powerful learning experience for our students, and I enjoyed the class very much myself. Based on my observations in this class, I believe that Dr. Saleh is a very skillful teacher.

Jorge G. Zornberg, Ph.D., P.E.

NAME	EID	LAST SEM	COMM POSITION	MAST OR DOCT	DEGREE	FIELD	YYS	2ND DEGREE	FIELD	YYS
AFROOZ, A R M NABIUL	aa59325	152	CHAIR	D	PH.D.	CIVIL ENGINEE	20152			
AICH, NIRUPAM	na5922	159	CHAIR	D	PH.D.	CIVIL ENGINEE	20159			
CHAMBERS, BRYANT ALLSON	bac58	169	MEMBER	D						
DAS, DIPESH	dd27968	169	CHAIR	D						
HAN, JOON KYOUNG	jh48766	169	MEMBER	D						
PLAZAS TUTTLE, JAIME G.	jgp666	169	CHAIR	D						
YOUN, SUNGMIN	sy5469	169	MEMBER	D						
ZHU, TONGREN	tz2342	169	MEMBER	D						

Postdoctoral Fellows
Navid Saleh

No postdoctoral fellows worked under my supervision during my tenure at UT.

3. RESEARCH, PUBLICATIONS & OTHER EVIDENCE OF SCHOLARSHIP/CREATIVITY

Budget Council Statement

Prepared by Desmond F. Lawler and Lynn E. Katz

Dr. Navid Saleh, 10 years removed from completion of his PhD., has developed a remarkable research program that is highly successful according to all standard metrics of research productivity, from grant money received to publication output. More importantly, the significance of his research for the drinking water field is growing significantly in the past few years since he joined the University of Texas faculty.

Navid did his Ph.D. research at Carnegie Mellon University under the direction of Greg Lowry; at about the time that Navid joined that group, CMU and Dr. Lowry were part of the team that successfully competed for an NSF Engineering Research Center on the Environmental Implications of NanoTechnology (known by its acronym as CEINT), with the lead institution being Duke University. Dr. Lowry became the Deputy Director of that center, Beginning then and continuing until now (and no doubt into the future), Dr. Saleh has been involved with nanotechnology. After completing his dissertation at Carnegie Mellon, Navid did a two-year post-doc with Dr. Menachim Elimelech at Yale University; Dr. Elimelech, a member of the National Academy of Engineering, is also widely known for his work with nanoparticles and their fate in the environment.

It is important to note that the manufacturing and use of nanomaterials has skyrocketed in the past fifteen years. In the decade from 2005 to 2014, the number of different nanomaterials manufactured grew from 504 to 1834.[1] These nanomaterials are used in hundreds of products. The most widely used are silver nanoparticles because of their anti-bacterial properties; these nanoparticles are now in socks and lotions in the developed world, but also in clay pots that are used as filters for drinking water in developing countries. The same properties that make nanomaterials highly valuable for various products (e.g., high reactivity) have made their presence in the environment worrisome, and exploring their fate and their impact on the natural environment has been the centerpiece of Dr. Saleh's research.

Dr. Saleh has investigated several different aspects of environmental behavior in simulated natural systems. The two primary means of particle removal in both environmental systems and in engineered water and wastewater treatment systems are aggregation (with similar or different particles) and granular media (a.k.a. porous media) filtration; Dr. Saleh has investigated both of these in a variety of publications. But the fact is that Dr. Saleh has done very much more than that—he has investigated the effects of various properties of nanomaterials (e.g., charge and shape), invented means of measuring nanomaterial characteristics and of differentiating the removal of each type of particle in dual-particle systems, and investigated with colleagues the effects of nanomaterials on bacterial efficacy in biofilms (a major treatment process in both

[1] Vance, Marina E., et al. "Nanotechnology in the real world: Redeveloping the nanomaterial consumer products inventory." *Beilstein journal of nanotechnology* 6.1 (2015): 1769-1780.

drinking water and wastewater for removal of organic material and, in some cases, inorganics). Nanomaterials are becoming widely used in a huge variety of applications and Dr. Saleh has gradually expanded his own horizons from the fate of these materials in the environment to their potential for enhancing water treatment. Indeed, his new thrust into the development of a microwave technology for disinfection could well be a major breakthrough in the drinking water field, both for point-of-use disinfection and for small water systems (of which there are tens of thousands in the US alone).

All of the researchers from whom we sought and received letters note his extensive research accomplishments and support his promotion. Kim Hayes, the Department Chair of the Department of Civil and Environmental Engineering at the University of Michigan states that Dr. Saleh's "scholarly achievements to date have already brought him significant recognition and acclaim, and he has the research program and infrastructure in place to magnify his impact even more in the foreseeable future."

David Sedlak, a professor at Berkeley, a member of the National Academy of Engineering, and the chief editor of *Environmental Science and Technology* (one of, if not the, top journals in our field) notes his strong publication record and states that "Saleh is recognized as one of the leading young researchers studying the fate of nanomaterials in the environment."

As noted above, Dr. Saleh's new direction is to use microwave technology in conjunction with nanomaterials to create "reactive oxygen species" in water that are strong oxidants and disinfectants. Although this work is still in its infancy and the development has a long way to go before commercialization can occur, we are aware of the success in his laboratory and expect this development to continue; he has proven the concept, both in theory and through results in the laboratory, so that this technology is highly likely, in our opinion, to be successful in practice. Since microwave technology is essentially ubiquitous, even in the undeveloped world, this invention of Dr. Saleh could well fulfill his dream of engineering "for the other 90%." Dick Luthy, a professor at Stanford and a member of the NAE, noted the potential of this work in his letter as follows:

> "Dr. Saleh is destined to make lasting contributions and shows excellent promise for the future. One example is his recent work on harnessing microwave radiation by absorption by metal oxide carbon nano-tube heterostructures to produce reactive oxygen species for disinfection. This is a highly original contribution with possibility for wide spread adoption in point-of-use treatment systems."

Of all the people we asked to comment on Dr. Saleh's record, the one who knows him and knows his work the best because of attending similar conferences is Jaehong Kim of Yale University. A few years ago, Kim was enticed to move to Yale from Georgia Tech, as Yale has emerged as a significant force in our field; Kim himself is widely recognized for his creative work with nanomaterials. Kim states that Dr. Saleh "has 11 papers that have been cited more than 100 times; that's even better than my own citation record. His productivity has been well supported by successful securing of external grants; Navid was able to attract funding from competitive funding agencies such as NSF, EPA, and NIH. The fact that he was funded six times

by NSF, all as the sole or primary PI, deserves special recognition, since the current success rate within CBET (the program that Navid applies to) is at most 5-6%.

The only potential negative that we see in Dr. Saleh's research record is that he did not receive an NSF CAREER award, and he is no longer eligible for further attempts. When he applied in summer 2015, he decided (and we, his mentors, supported this decision) to use the developing work on microwave technology as the thrust of his proposal. It probably would have been safer for him to write something more incremental in his mainline focus on environmental fate and transport of nanomaterials, but he saw this new area as a critical one that will ultimately have greater impact on society, and he was driven to use this new work for his CAREER proposal. While unsuccessful in obtaining the CAREER award, we believe that his work will not only be funded but will have a great impact on our field and on the safety of drinking water in communities throughout the world.

Overall, Dr. Saleh's research record is superb; his Google Scholar h-index value (23) is clearly very high for an assistant professor in environmental engineering. Note that Dr. Pedro Alvarez of Rice University stated in his letter (and we concur with this statement) that Dr Saleh's publication record, both in terms of the number of publications and the h-index, "is commensurate with that of some scholars being promoted to the rank of full professor at major research universities." Dr. Saleh's research has been highlighted on the covers of both *Environmental Chemistry* (2014, 11) and on *Environmental Science: Nano* (2015, 2, 1). On the basis of his publications, Dr. Saleh has achieved national recognition as a rising star in environmental nanotechnology. His vision and creativity are matched by his productivity. In the short time he has been at UT, he has not only collaborated with more senior faculty but he has developed and led the efforts to secure funding for the ideas; that is, he has often been the leader even when working with more senior colleagues on research proposals. This research record of Dr. Saleh far exceeds the expectations for promotion in our department.

FIVE SIGNIFICANT PUBLICATIONS:

** indicates supervised student(s)*

1. *Afrooz, A. R. M. N., *Khan, I. A., Hussain, S. M., Saleh, N. B. (2013). Mechanistic heteroaggregation of gold nanoparticles in a wide range of solution chemistry. *Environmental Science and Technology. 47 (4)*, 1853-1860.
2. *Khan, I. A., *Afrooz, A. R. M. N., Flora, J. R. V., Schierz, P. A., Ferguson, P. L., Sabo-Attwood, T., Saleh, N. B. (2013). Chirality affects aggregation kinetics of single-walled carbon nanotubes. *Environmental Science and Technology. 47 (4)*, 1844-1852.
3. Chambers, B. A., *Afrooz, A. R. M. N., Bae, S., *Aich, N., Katz, L., Saleh, N. B., Kirisits, M. J. (2014). Effects of Chloride and Ionic Strength on Physical Morphology, Dissolution, and Bacterial Toxicity of Silver Nanoparticles. *Environmental Science and Technology. 48 (1)*, 761-769.
4. *Aich, N., Boateng, L. K., *Sabaraya, I. V., *Das, D., Flora, J. R. V., Saleh, N. B. (2016). Aggregation Kinetics of Higher Order Fullerene Clusters in Aquatic Systems. *Environmental Science and Technology. 50 (7)*, 3562-3571.
5. *Afrooz, A. R. M. N., *Das, D., Murphy, C. J., Vikesland, P. J., Saleh, N. B. (2016). Co-transport of gold nanospheres with single-walled carbon nanotubes in saturated porous media. *Water Research. 99*, 7-15.

Research Statement

Navid Saleh

(UT: University of Texas; SC: University of South Carolina; §: one of the 5 significant publications)

Inspired by *The Idea of Justice* (a book by Amartya Sen, 1998 Nobel Prize winner in Economics) that advocates for enabling 'social choices' to minimize injustice in society, I have been aiming to engineer for people at the bottom of the pyramid. My research vision is to develop safe and effective nano-enabled technologies for water treatment, which can provide higher efficiency for target contaminant removal at a reasonable (and perhaps lower) cost. I have made significant strides towards realizing this vision with measurable impact. Over the first several years of my career, my laboratory has focused on assessing the aggregation and deposition of nanomaterials (NMs), important environmental fate and transport processes that subsequently impact environmental/human exposure and safety. Expertise acquired during this time has prepared my group to apply a 'safer by design' approach for cost-effective nano-enabled water treatment technologies. Further, my efforts to develop project-based pedagogy have allowed integration of research and teaching (*NSF's NUE program funded projects; pub# SC-22*) and have served as a source of inspiration for my career.

Through a substantial contribution to the nano-environmental engineering literature (*38 publications over seven years*), my research group has become a leader in the field. I am now advancing the frontier in a new direction; i.e., systematically assessing environmental health and safety of complex NMs. Additionally, my group is the first to enable microwave radiation for effective water disinfection, a breakthrough in water treatment technology, but one in which we are still in the early stages of development. While keeping these two research directions in the forefront, I have diversified my portfolio into materials engineering for construction (*on nano-enabled asphalt and cementitious materials*) and NMs in biomedical applications and biosafety assessment (*NIH-funded project and new collaboration with Marissa Rylander of UT's Department of Mechanical Engineering*). This comprehensive research program, funded by several federal and state agencies as well as industrial partners (*$4M Total, ~$1.5M my share*), is expected to experience a significant growth in the coming years.

Research Accomplishments in Nanomaterial Fate and Transport

Environmental health and safety (EHS) studies of NMs have been a focus in the nano-environmental literature. Evaluating the influences of key NM attributes, e.g., chirality of carbon nanotubes (*pub# UT-5, 8, 9 17; SC-16§, 20*), size and shape of metal nanocrystals (*pub# UT-6; SC-8, 11, 14*), and dopant concentration of metal oxides (*pub# UT 15*) is essential for elucidating the mechanisms underlying important environmental processes. My group has been a leader in this area with eight publications that are highly cited (each cited >25 times). However, most nano-EHS studies are performed in singular particle systems under controlled laboratory environments that have little relevance to complex natural systems. Reliability in any fate and transport prediction not only requires mechanistic understanding but also necessitates aggregation, deposition, and toxicity studies in a complex aquatic environment. My group is one of the first to develop a method for assessing aggregation in the presence of other particles (*pub# SC-15§*) and under a wide range of water conditions; this publication has been highly cited (36 times) by well-known nano-environmental groups. Transport in porous media is another important environmental process, which also necessitates understanding in simulated complex systems. My group is one of the first to systematically assess NM transport through porous

media in the presence of a secondary NM (*pub# UT-14*[§]). We are also the first to study transport in complex simulated landfill conditions (*pub# SC-19*). These studies have added valuable insight into transport processes in complex systems.

My group's expertise in analyzing physicochemical behavior of NMs has allowed for expanding my work into nanotoxicity. We have assessed aggregation state, determined aggregate structure, and characterized NMs in bacterial, human cell, and higher trophic level environmental species' culture environments (*pub# UT-1; SC-5, 6, 8, 11, 18, 20, 21, 23*[§]), which have allowed for deciphering underlying mechanisms for nanotoxicity. These papers have been cited 218 times (total); including many by renowned nano-environmental experts. One of the papers (*pub# SC-23*[§]), which performs a comprehensive evaluation of chloride- and ionic strength-mediated changes in physical morphology, dissolution, and bacterial toxicity of silver nanoparticles, has been particularly impactful (cited 33 times). This publication represents a strong collaboration with my UT colleagues, where my group had equal and integral contribution to the study.

Such systematic evaluation in complex natural and biological systems has advanced our knowledge for determining the safety of simple NMs, but the increasing complexity of nanostructure design brings new uncertainties to our current understanding in this field. Complex materials present emergent properties (not displayed by their components), and these structures likely will display behavior that is beyond the sum of the parts. Strategies to advance the frontier of nano-EHS research thus have become essential (*invited review articles and perspectives: pub# UT-3, 4, 7, 10*). My group has been at the center of safety assessments for simple NMs and has become a leader in nano-EHS studies of complex NMs (*pub# UT-13*[§]*, 16; SC- 7, 21*).

Breakthrough Disinfection Technology

Knowledge generated on nano-safety and expertise developed during the foundational years of my research program (*pub# SC-1, 3, 4, 9*) have led me to develop a breakthrough irradiation-based disinfection technology. My group has designed and developed synthesis processes for novel nano-heterostructures, which has facilitated this technological breakthrough. We have engineered complex carbon nanotube-metal oxide NMs that can harness the power of microwave radiation for water disinfection. The idea is to utilize an existing technology (i.e., microwave devices) that has diffused deeply into society to perform an unintended function (i.e., water disinfection). However, the position of microwave radiation in the electromagnetic spectrum prevents this widely available technology from efficient use for disinfection on its own. Recently, my group has successfully combined the microwave-absorption properties of carbon nanotubes with photothermal and/or upconversion-capabilities of metal oxides to prepare complex heterostructures capable of producing reactive oxygen species for disinfection (*pub# UT 17, patent# UT-1 (patent application filed), and conference proceedings# UT-17, 20*). This potentially transformative technology can be deployed at point-of-use and can be scaled-up for large-scale drinking water and aquaculture applications. Microwave use has several advantages: turbid water can be disinfected (whereas effective UV disinfection requires a clear optical path) and chemical disinfectant usage can be decreased (where chlorine has well-known environmental and human health consequences). This breakthrough technology is the central focus for my group in terms of forthcoming grant proposals, publications, and patents.

Research Impact

My research thus far has had measurable impact on the field and is cited by scholars across fields. My h-index is 23 with a total career citation count of 4202, where 3181 of the citations have

been made between 2011 and 2016. Out of the fifty publications in my career, eleven have been cited more than 100 times (2 among these have >500 citations) and my i-10 index (papers cited more than 10 times) is 28; 17 out of the 28 of these papers were published during my tenure as an assistant professor (both at UT and SC). My work has been cited by top experts in the field that include Mark Wiesner, NAE member from Duke University (*pub# UT-1, 7, SC-17, 20*), Howard Fairbrother from Johns Hopkins University (*pub# SC-2*), Richard Zepp and Dermont Bouchard from the U.S. Environmental Protection Agency (*pub# SC-15, 16*), Robert Tanguay, distinguished toxicologist (*pub# UT-3*), among many others. I have started to gain international recognition as evidenced by citations from top European experts such as Antonia Praetorius from ETH, Zurich (*pub# SC-15*) and Frank von der Kammer from University of Vienna, Austria (*pub# SC-15*). With the new and focused efforts on complex nano-heterostructure fate and transport and on the new breakthrough water treatment technology, I expect to make an even stronger impact in the nano-environmental literature.

Grantsmanship

My research has been consistently funded by federal and state agencies and industrial partners. I have received 14 grants and contracts (9 at UT) in my career. Federal agencies include National Science Foundation, NSF (6 grants), National Institute of Health, NIH (1 R01 grant), U.S. Environmental Protection Agency, EPA (2 grants), and U.S. Air Force Laboratory (1 contract). State agencies that have funded my work include Texas Department of Transportation (1 contract), South Carolina Department of Transportation (1 contract), and the Texas Hazardous Waste Research Center (1 grant). I also have received one contract from an industrial partner - Goldstar Engineering and Construction Co., South Korea. My career research funding has been ~$4M, of which ~$1.5M has been my research group's share. I have been the principal investigator in most of these grants and contracts (8/9 at UT and 11/14 over my career). NM research is inherently interdisciplinary, and thus necessitates developing effective collaboration with experts having complementary expertise. I have been successful in forming effective research teams and have led most of the collaborative projects. Such collaborations with colleagues at SC (*pub# UT-13§; SC-22*), UT (*pub# UT-11, 16; SC-23§*), and elsewhere (*pub# UT-13§, 14§, 17*) have been an essential component in realizing my research vision.

Vision for the Future

"Fundamental knowledge leading to transformative treatment solutions" will continue to be the guiding principle of my research. For the future, I envision advancing the capabilities of my laboratory to continue answering critical questions on complexity at the nano-scale and enrich the knowledge in this field. Complex nano-heterostructures are already in use and their safety assessment is critical. NSF's "Nano-bio Phenomena and Processes in the Environment" program under the Division of Chemical, Bioengineering, Environmental and Transport Systems has identified these complex nanostructures as one of their key priorities. My group is the leader in environmental safety assessment of nano-heterostructures and thus is well positioned to perform high impact NSF-funded research in the coming years. My recently funded NSF grant on nanohybrids is an indication of the interest level of NSF for such studies. I am planning to leverage results obtained from this nanohybrid grant to submit a new NIH R01 application, where I will study (in collaboration with Sabo-Attwood at the University of Florida) the impact of carbon nanotube-metal oxide nanohybrids on virus infectability. NIH has recently become

interested in funding fundamental research geared toward application. Preparing devices and applications for reduced viral infectability will be of high interest to NIH.

We already have developed capabilities in our group to synthesize a large array of carbon nanotube-metal oxide nanohybrids, where we can tune metal oxide composition and loading to achieve a wide range of reactivity and function. I plan to submit multiple NSF proposals for removal of target pollutants (organics, dissolved metal, and radionuclides) with these tailored and functional materials possessing unique capabilities. For example, carbon nanotube-silver nanohybrids will be utilized to remove organics while serving as an effective disinfectant. Carbon nanotube-titanium dioxide and carbon nanotube-zinc oxide nanohybrids are prepared to remove organic contaminants via the Pickering emulsion route, where nanotubes will stabilize emulsion droplets and metal oxides will be photoactive or reactive (depending on the type of metal oxide) to decontaminate water. I have developed a new collaboration with Dr. Markita Landry at the University of California, Berkeley, where her group is testing our nanohybrids for potential use as nanosensors while understanding formation of protein corona on these novel nanomaterials. We plan to submit multiple NSF proposals this fall on these projects and are now collecting preliminary data.

One of the key foci in my laboratory now is to advance the breakthrough technology we have developed and understand the fundamental processes of disinfection via microwave irradiation. My plan is to prepare a range of materials with unique photothermal and/or upconversion capabilities (with a wide range of lanthanide series elements) and find the optimum material composition. Furthermore, optimization on microwave radiation frequency, time of irradiation, and reactor design are essential for efficient use of this technology. My group is currently designing novel experiments to monitor photothermal changes (with infra-red cameras) as well as electron shuttling abilities (with potentiostats) of these materials at the nano-scale. A new proposal on interfacial processes of these materials and resulting antimicrobiality will be submitted to NSF this fall.

This novel water treatment technology with abilities to treat turbid water is also likely to be transformative for aquaculture applications. I will be taking advantage of the Food-Energy-Water nexus initiative and have plans to submit multiple proposals to the Department of Agriculture. Use of this material in a point-of-use application for low-income communities has potential to make this technology impactful in the developing parts of the world. I will be looking for grant proposal opportunities from the Gates Foundation for such international efforts. My new EPA grant on water treatment at Oaxaca, Mexico with my colleague Desmond Lawler is serving as a suitable platform to establish and expand my collaborations internationally. Leveraging this grant I am currently working on a Partnership for International Research and Education (PIRE) proposal, where this technology is at the front and center of aquaculture and water treatment applications in Haiti and Oaxaca, Mexico. The PIRE team involves my collaborators from University of Florida and Duke University as well as their partners in Haiti. It is important to note that there has been a new signature initiative by the White House titled: "Water Sustainability through Nanotechnology: Nano-scale Solutions for a Global-Scale Challenge". My group is perfectly poised to aggressively pursue this signature initiative in the near future.

Fundamentals-driven research to develop impactful water treatment technology has been the goal of my group. Our arduous contributions to the nano-EHS literature and new discoveries on water disinfection have painted a propitious future for my research group. I am extremely excited to continue this journey with my UT family.

Candidate's Statement on Research

Navid Saleh

Table 1. Research Summary while in Rank at University of Texas (UT)

Metric	Value
Peer-Reviewed Journal Publications in Rank	15 of <50>
Peer Reviewed Conference Proceedings Publications in Rank	20 of <48>
Number of Papers with UT Students in Rank	14
Total Citations of all Publications (career) from ***ISI Web of Knowledge***	3044
h-index (career) from ***ISI Web of Knowledge***	19
Google Scholar Total Citations of all Publications (career)	4213
Google Scholar h-index (career)	23
Total External Research Funding *Raised* (total share at UT)	$2,614,923
Total External Research Funding *Raised* (candidate share at UT)	$815,167
Total Number of External Grants/Contracts Received at UT	9
Number of External Grants/Contracts Received as PI	8 of <9>

Table 2. External Grants and Contracts Awarded while in Rank at University of Texas (UT)

Co-Investigators†	Title	Agency	Project Total	Candidate's Share	Grant Period
PI: Navid Saleh Co-PIs: Saleh only PI at UT. Peter Vikesland at Virginia Tech and Catherine Murphy at University of Illinois. Vikesland overall PI of the project.	Collaborative Research: Fate, Transport, and Organismal Uptake of Rod-Shaped Nanomaterials	National Science Foundation (NSF)	$119,016 (UT Share)	$119,016	01/01/14-09/30/16
PI: Navid Saleh Co-PIs: Saleh only PI at UT. Tara Sabo-Attwood and John Lednicky at University of Florida and P Lee Ferguson at Duke University. Sabo-Attwood overall PI of the project.	Contribution of Toll-Like Receptors in the Pulmonary Response to Nanoparticles and Pathogens	National Institute of Health (NIH)	$173,016 (UT Share)	$173,016	05/01/14-04/30/17
PI: Navid Saleh Co-PIs: Mary Jo Kirisits, Brian Korgel, and Hillary Hart.	NUE: Sustainable Nanotechnology Education for Undergraduate Engineering Students	National Science Foundation (NSF)	$199,997	$120,000	10/01/14-09/30/17
PI: Desmond Lawler Co-PIs: Lynn Katz, Mary Jo Kirisits, Gerald Speitel, Kerry Kinney, and Navid Saleh.	Water Innovation Network for Sustainable Small Systems (WINSSS)	Environmental Protection Agency (EPA)	$1,456,225 (UT Share)	$100,000	09/01/14-08/31/17
PI: Navid Saleh Co-PIs: Amit Bhasin at UT and Enad Mahmoud at UT Pan American.	Effectively Dispersed Carbon Nanotube Enhanced Asphalt: Novel Foamed Delivery and Traditional Mixing Techniques	Texas Department of Transportation (TxDOT)	$265,438	$110,000	01/01/15-12/31/16
PI: Navid Saleh Co-PIs: Mary Jo Kirisits, Delia Milliron, and Lynn Katz.	UNS: Role of dopant concentration and distribution in the environmental behavior of indium tin oxide nanoparticles	National Science Foundation (NSF)	$299,917	$100,000	06/01/15-05/30/17
PI: Navid Saleh Co-PI: Mary Jo Kirisits.	Development of nanomaterial use, transport, and disposal guidelines for laboratories at UT Austin and other THWRC Consortium Universities	Texas Hazardous Waste Research Center (THWRC)	$6,000	$3,000	09/01/15-07/15/17
PI: Navid Saleh Co-PIs: Saleh only PI at UT. Tara Sabo-Attwood at University of Florida. Saleh overall PI of the project.	Collaborative Research: EAGER: Interaction of Carbon-Metal Nanohybrids at Environmental Interfaces	National Science Foundation (NSF)	$80,135 (UT Share)	$80,135	05/20/16-04/30/17

PI: Navid Saleh Co-PI: Desmond Lawler.	A Nano-Silver and Zeolite Solution: Ceramic Water Filters for Disinfection and Hardness Removal	Environmental Protection Agency (EPA)	$14,999	$10,000	08/15/16-08/14/17
TOTAL			**$2,614,923**	**$815,167**	

Table 3. Research Summary while in Rank at University of South Carolina (USC)

Metric	Value
Peer-Reviewed Journal Publications in Rank	23 of <50>
Peer Reviewed Conference Proceedings Publications in Rank	19 of <49>
Number of Papers with USC Students in Rank	21
Total External Research Funding *Raised* (total share at USC)	$1,329,850
Total External Research Funding *Raised* (candidate share at USC)	$673,108
Total Number of External Grants/Contracts Received	5
Number of External Grants/Contracts Received as PI	3 of <5>

Table 4. External Grants and Contracts Awarded while in Rank at University of South Carolina (USC)

Co-Investigators†	Title	Agency	Project Total	Candidate's Share	Grant Period
PI: Navid Saleh Co-PIs: Tara Sabo-Attwood and P. Lee Ferguson. Both Sabo-Attwood and Ferguson were at USC at that time.	Influence of diameter and chirality of single-walled carbon nanotubes on their fate and effects in the aquatic environment	National Science Foundation (NSF)	$436,013	$160,108	10/01/09-09/30/13
PI: Navid Saleh Co-PIs: Juan Caicedo and Ann Johnson at USC.	NUE: Nano in a Global Context for Engineering Students	National Science Foundation (NSF)	$200,000	$180,000	10/01/10-09/30/14
PI: Yeomin Yoon at USC Co-PIs: Navid Saleh and Joseph R. V. Flora at USC.	Applications of Carbon Nanotubes in UF and MF Membranes: Pretreatment in Seawater Desalination	Gold Star Engineering and Construction Co., South Korea	$220,000	$73,000	05/01/10-04/30/13
PI: Navid Saleh	Mechanistic Understanding of Nanomaterial Toxicity: Aggregation and Surface Interaction in Biologically Relevant Conditions	US Air Force Laboratory	$60,000	$60,000	10/15/11-04/30/13
PI: Jonathan Goodall at USC Co-PIs: Navid Saleh and Michael Meadows at USC.	A GIS-based Mitigation Forecasting Tool and Study on Advanced Mitigation Processes used by DOTs	South Carolina Department of Transportation (SCDOT)	$413,837	$200,000	01/01/13-12/31/15
TOTAL			**$1,329,850**	**$673,108**	

*Total **career** external research funding raised $3,944,773; candidate's share is $1,488,275.*

External Funding and Division of Labor

Navid Saleh

This document lists all externally funded grants and contracts that I have received while in rank at University of Texas (Table 1) and at University of South Carolina (Table 2). An italicized row corresponds a project where I was not the PI. Additional detail on each grant or contract can be found in my CV.

Table 1. Division of Labor for External Grants and Contracts Awarded while in Rank at UT

Title	Agency	Project Total	Candidate's Share	Percentage
Collaborative Research: Fate, Transport, and Organismal Uptake of Rod-Shaped Nanomaterials	National Science Foundation (NSF)	$119,016 (UT Share)	$119,016	100%
Contribution of Toll-Like Receptors in the Pulmonary Response to Nanoparticles and Pathogens	National Institute of Health (NIH)	$173,016 (UT Share)	$173,016	100%
NUE: Sustainable Nanotechnology Education for Undergraduate Engineering Students	National Science Foundation (NSF)	$199,997	$120,000	60%
Water Innovation Network for Sustainable Small Systems (WINSSS)	*Environmental Protection Agency (EPA)*	*$1,456,225 (UT Share)*	*$100,000*	*7%*
Effectively Dispersed Carbon Nanotube Enhanced Asphalt: Novel Foamed Delivery and Traditional Mixing Techniques	Texas Department of Transportation (TxDOT)	$265,438	$110,000	42%
UNS: Role of dopant concentration and distribution in the environmental behavior of indium tin oxide nanoparticles	National Science Foundation (NSF)	$299,917	$100,000	33%
Development of nanomaterial use, transport, and disposal guidelines for laboratories at UT Austin and other THWRC Consortium Universities	Texas Hazardous Waste Research Center (THWRC)	$6,000	$3,000	50%
Collaborative Research: EAGER: Interaction of Carbon-Metal Nanohybrids at Environmental Interfaces	National Science Foundation (NSF)	$80,135 (UT Share)	$80,135	100%
A Nano-Silver and Zeolite Solution: Ceramic Water Filters for Disinfection and Hardness Removal	Environmental Protection Agency (EPA)	$14,999	$10,000	66%
TOTAL		**$2,614,923**	**$815,167**	

Table 2. Division of Labor for External Grants and Contracts Awarded while in Rank at USC

Title	Agency	Project Total	Candidate's Share	Percentage
Influence of diameter and chirality of single-walled carbon nanotubes on their fate and effects in the aquatic environment	National Science Foundation (NSF)	$436,013	$160,108	37%
NUE: Nano in a Global Context for Engineering Students	National Science Foundation (NSF)	$200,000	$180,000	90%
Applications of Carbon Nanotubes in UF and MF Membranes: Pretreatment in Seawater Desalination	Gold Star Engineering and Construction Co., South Korea	$220,000	$73,000	33%
Mechanistic Understanding of Nanomaterial Toxicity: Aggregation and Surface Interaction in Biologically Relevant Conditions	US Air Force Laboratory	$60,000	$60,000	100%
A GIS-based Mitigation Forecasting Tool and Study on Advanced Mitigation Processes used by DOTs	South Carolina Department of Transportation (SCDOT)	$413,837	$200,000	48%
TOTAL		**$1,329,850**	**$673,108**	

*Total **career** external research funding raised $3,944,773; candidate's share is $1,488,275.*

Change photo

Navid B Saleh

Edit Follow

Assistant Professor, UT Austin
Nanotechnology, Environmental Engineering, Nano-Cement Composites
Verified email at utexas.edu - Homepage
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Citation indices	All	Since 2011
Citations	4213	3192
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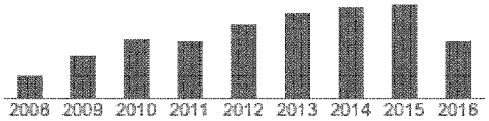
i10-index	28	28



Title Add More 1–20 Cited by Year

Title	Cited by	Year
Titanium dioxide (P25) produces reactive oxygen species in immortalized brain microglia (BV2): implications for nanoparticle neurotoxicity TC Long, N Saleh, RD Tilton, GV Lowry, B Veronesi Environmental Science & Technology 40 (14), 4346-4352	656	2006
Aggregation and sedimentation of aqueous nanoscale zerovalent iron dispersions T Phenrat, N Saleh, K Sirk, RD Tilton, GV Lowry Environmental Science & Technology 41 (1), 284-290	554	2007
Ionic strength and composition affect the mobility of surface-modified Fe0 nanoparticles in water-saturated sand columns N Saleh, HJ Kim, T Phenrat, K Matyjaszewski, RD Tilton, GV Lowry Environmental Science & Technology 42 (9), 3349-3355	368	2008
Surface modifications enhance nanoiron transport and NAPL targeting in saturated porous media N Saleh, K Sirk, Y Liu, T Phenrat, B Dufour, K Matyjaszewski, RD Tilton, ... Environmental Engineering Science 24 (1), 45-57	336	2007
Nanosize titanium dioxide stimulates reactive oxygen species in brain microglia and damages neurons in vitro TC Long, J Tajuba, P Sama, N Saleh, C Swartz, J Parker, S Hester, ... Environmental Health Perspectives, 1631-1637	333	2007
Stabilization of aqueous nanoscale zerovalent iron dispersions by anionic polyelectrolytes: adsorbed anionic polyelectrolyte layer properties and their effect on aggregation and sedimentation T Phenrat, N Saleh, K Sirk, HJ Kim, RD Tilton, GV Lowry Journal of Nanoparticle Research 10 (5), 795-814	301	2008

Add co-authors

- Gregory V. Lowry
- Tanapon Phenrat
- Nabiul Afrooz
- Iftheker A Khan
- Krzysztof Matyjaszewski
- Nirupam Aich
- Menachem Elimelech
- Hye-Jin Kim
- Joseph R.V. Flora
- Saber Hussain, PhD. ATS Fell...

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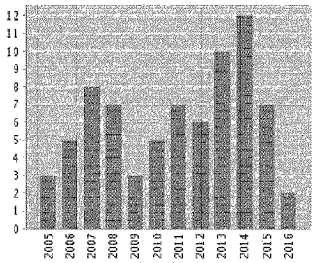

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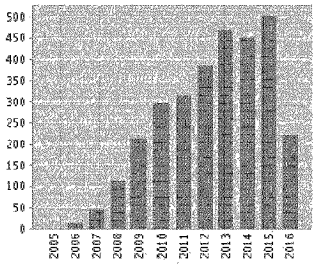

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Page 1 of 8

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	2012	2013	2014	2015	2016	Total	Average Citations per Year
	387	470	454	503	222	3044	253.67
1. **Titanium dioxide (P25) produces reactive oxygen species in immortalized brain microglia (BV2): implications for nanoparticle neurotoxicity** By: Long, Thomas C.; Saleh, Navid; Tilton, Robert D.; et al. ENVIRONMENTAL SCIENCE & TECHNOLOGY Volume: 40 Issue: 14 Pages: 4346-4352 Published: JUL 15 2006	56	66	50	56	16	460	41.82
2. **Aggregation and sedimentation of aqueous nanoscale zerovalent iron dispersions** By: Phenrat, Tanapon; Saleh, Navid; Sirk, Kevin; et al. ENVIRONMENTAL SCIENCE & TECHNOLOGY Volume: 41 Issue: 1 Pages: 284-290 Published: JAN 1 2007	35	55	61	75	27	395	39.50
3. **Nanosize titanium dioxide stimulates reactive oxygen species in brain microglia and damages neurons in vitro** By: Long, Thomas C.; Tajuba, Julianne; Sama, Preethi; et al. ENVIRONMENTAL HEALTH PERSPECTIVES Volume: 115 Issue: 11 Pages: 1631-1637 Published: NOV 2007	36	44	30	42	14	264	26.40
4. **Ionic strength and composition affect the mobility of surface-modified Fe-0 nanoparticles in water-saturated sand columns** By: Saleh, Navid; Kim, Hye-Jin; Phenrat, Tanapon; et al. ENVIRONMENTAL SCIENCE & TECHNOLOGY Volume: 42 Issue: 9 Pages: 3349-3355 Published: MAY 1 2008	38	41	40	25	26	252	28.00
5. **Surface modifications enhance nanoiron transport and NAPL targeting in saturated porous media** By: Saleh, Navid; Sirk, Kevin; Liu, Yueqiang; et al. ENVIRONMENTAL ENGINEERING SCIENCE Volume: 24 Issue: 1 Pages: 45-57 Published: JAN-FEB 2007	25	38	31	26	16	237	23.70
6. **Stabilization of aqueous nanoscale zerovalent iron dispersions by anionic polyelectrolytes: adsorbed anionic polyelectrolyte layer properties and their effect on aggregation and sedimentation** By: Phenrat, Tanapon; Saleh, Navid; Sirk, Kevin; et al. JOURNAL OF NANOPARTICLE RESEARCH Volume: 10 Issue: 5 Pages: 795-814 Published: MAY 2008	30	29	33	35	13	209	23.22
7. **Aggregation Kinetics of Multiwalled Carbon Nanotubes in Aquatic Systems: Measurements and Environmental**							

4. COUNSELING AND ADVISING

Budget Council Statement

Prepared by
Desmond F. Lawler and Lynn E. Katz

Dr. Saleh has been active in advising and counseling in all of the ways that we expect of him, and he has exceeded those expectations in several cases. At the undergraduate level, the minimum expectation is to participate in the coursework advising every semester just prior to the course registration period. Navid has, of course, done this along with all of the other CAEE faculty, but he has also been quite active in two other aspects of advising undergraduate students—getting them involved in research and mentoring their professional and personal growth. As his own statement indicates, he has already (in the few years that he has been in our program) involved several students in his research program and done so at a quite deep level.

Dr. Saleh did the same at the University of South Carolina, and we are the beneficiaries of at least one case of that, in that an undergraduate there a few years ago (Louis Stetson Rowles) is now a Ph.D. student in our program. Stetson's involvement with Dr. Saleh's research at South Carolina, and particularly his involvement with the Navajo in New Mexico, enabled him to write a superb and successful application for an NSF Graduate Fellowship, which he is now using in our program. This example is quite telling, in the sense that it reflects Dr. Saleh's interest not in research for research sake, but in research that solves environmental (here, drinking water) problems for those less privileged. Dr. Saleh's mentoring has led Stetson into a similar life's thrust—his PhD research is involved with embedding silver nanoparticles into clay pots that are used to make pond, lake, or river water into safe drinking water. The small pore spaces of the pot filters larger particles from the water, but the silver provides disinfection of bacteria and viruses. This technique is known and used throughout developing countries, but the contribution that Stetson (and Dr. Saleh) hope to make is to extend the life of these pots to provide disinfection for a much longer time. The point here is not the research *per se*, but the fact that Dr. Saleh's mentoring of an undergraduate has led to an NSF fellowship and a direction of a life toward public service at the deepest level.

At the graduate level, it is quite clear that Dr. Saleh is a superb mentor and research advisor. The two Ph.D. students that he has graduated are both in excellent positions for the start of their post-graduate careers, one (Nabiul Afrooz) as a post-doctoral fellow at Stanford and the other (Nirupam Aich) as an assistant professor at the University of Buffalo. Both of these former students were co-authors of several papers with Dr. Saleh while working with him, and they both are very grateful for the extensive mentoring that Dr. Saleh gave them, not only about research, but on carrying on a professional life. His current students are equally pleased with his mentoring of them. As he explains in his statement, he has a highly organized method for directing students through their degree programs, meeting with them every week and having them prepare written reports on their weekly progress. This strong oversight, however, does not

stifle their own creativity and their ability to direct their own research; rather, he seems to push them to attain new insights and new directions on their own.

In summary, we believe that Dr. Saleh is involved in all aspects of advising at both the undergraduate and graduate levels, and is doing so at a high level.

Academic Advising, Counseling, and Other Student Services

Navid Saleh

One of the most rewarding and enjoyable parts of being a faculty member is to see young students become professionals and achieve success in their own careers. I feel privileged to be able to advise and mentor a new generation of engineers at both the undergraduate and graduate levels.

Undergraduate Advising

I have encouraged my students in class to participate in undergraduate research and have been fortunate to advise four undergraduate students in research since arriving at UT in Spring 2014. My philosophy in this case is to involve undergraduate students with one or two graduate students and allow them to explore research options in the field. Based on their interest, I later mentor them to find their own independent research project. The first undergraduate student at UT was Gregory Latimer, who was interested to work with me and subsequently received an undergraduate research grant. Gregory carried out a literature survey on saltwater intrusion and water quality of groundwater in Bangladesh. During the second year of my teaching, Kelsey Turpin showed interest in conducting research and has been an undergraduate researcher in my laboratory for more than a year. Kelsey has worked on nanomaterial synthesis and characterization and has recently started to pursue independent research. Erica Mason and Sneha Jain also are working in my laboratory. Erica has begun an independent research project on enhanced photocatalysis via nanomaterial-mediated Pickering emulsion and has already won multiple poster awards at UT. Sneha is working on synthesis of complex nano-scale heterostructures and shortly will be beginning independent research.

I have been fortunate to work with high caliber undergraduate researchers since my time as an assistant professor at the University of South Carolina. I mentored four undergraduate students there as well. One of them, Atif A. Choudhury, has published a journal article as a co-author (SC-3). I also have mentored students on their National Science Foundation graduate research fellowship applications. Lewis Stetson Rowles III (undergraduate at the University of South Carolina) won this fellowship and is currently working as a Ph.D. student at UT under my co-supervision. I also have mentored Kelsey Turpin at UT on her fellowship application.

Graduate Advising

I have developed a graduate mentorship style where students experience intellectual freedom in a structured research framework. After recruitment to the group I allow the graduate student to find his/her area of interest within the framework of my laboratory's vision. After a few months of preliminary data collection, the student is asked to develop a research hypothesis and establish a detailed plan for conducting the research. I strongly advise the students to prepare a detailed outline for a publication, even before they commence their work. This outline has been developed in my group over the past seven years, and includes a target journal, key headings and subheadings, preliminary data, and plots with expected data trend. The students comment that this structured outline has been extremely helpful to stay focused and complete the research in hand. As the research progresses and the outlined publication takes shape, I work very closely with the students to begin writing the manuscript. I also have developed a structure for writing a paper for the peer-reviewed literature. I call this technique 'deconstructing a published paper for writing your own'. When writing a paper with me, my graduate student uses a published article

from the target journal on a similar theme and deconstructs the article in sections, sub-sections, and even paragraphs with the sections. As my students write sections of the manuscript, I provide suggestions and give them freedom to make the revisions. My students have said that this technique allows them to organize their own story and makes the manuscript writing process more efficient.

My weekly research group meeting also is structured. The graduate students are strongly advised to submit a weekly progress report the night before this meeting. They follow a format to submit these reports, where key data collected over the week is presented with a short discussion followed by a proposed work plan for the coming week. The group meeting starts off with an overall summary, announcements of achievements, new paper invitations, and conference calls. Then I go around the table and discuss with each student their specific research or academic issues that they could not discuss during their individual weekly meetings. The progress report is used to guide such discussion. The students have repeatedly told me that a weekly progress report has helped them keep track of their work and plan effectively.

My graduate mentorship efforts go beyond my group, as I have served on M.S. and Ph.D. committees of many environmental and water resources engineering (EWRE) students. I have also closely advised three EWRE students: Bryant Chambers (advisor: Mary Jo Kirisits), Tongren Zhu (advisor: Desmond Lawler), Sungmin Youn (advisor: Desmond Lawler), and Anne Mikelonis (advisor: Desmond Lawler). I have advised them in their research design and analysis of collected data. I always make myself available to any UT student who is seeking advice for his or her career.

My philosophy is to involve Ph.D. students in teaching to prepare them for their future career. I have not only involved my graduate students in course material preparation and occasional lecturing in some of my courses, but I also have involved them in researching and developing new problem-based pedagogical teaching techniques. A. R. M. Nabiul Afrooz and Iftheker Khan have worked very closely with me to develop problem-based learning (PBL) modules and have been co-authors on a journal paper on education (SC-22). Nirupam Aich and Dipesh Das have worked with me to organize a PBL workshop in August 2013. Such exposure to teaching and pedagogical training has encouraged them to pursue academic careers. Further, I have mentored my students in preparing strong postdoctoral fellowship and faculty applications. Nirupam Aich has started as an Assistant Professor in Civil and Environmental Engineering at the State University of New York at Buffalo in 2016. A. R. M. Nabiul Afrooz has been working as a postdoctoral scholar at Stanford University, and Iftheker Khan has been serving in a similar position at the University of Rhode Island. Most of the M.S. students graduating from my group (4/4.5 in my career) have continued with me for their Ph.D. dissertation. I have been fortunate to have high quality graduate students, who have developed great camaraderie in my group. Mentoring these exceptional students and watching their career success have been continuing sources of inspiration for me.

Candidate's Statement on Advising, Counseling and Other Student Services

Navid Saleh

Table 1. Summary of Academic Advising (University of Texas)

Metric	Value
Student Organizations Advised	
Undergraduates Supervised	4
PhD Students Completed *	2 (2 sole advisor)
MS Students Completed *	1.5 (1 sole advisor)
PhD Students in Pipeline (as of 09/2016)*	3.5 (3 sole advisor)
MS Students in Pipeline (as of 09/2016)*	2.5 (2 sole advisor)

*count 1 if sole advisor, 0.5 if co-advised

Table 2. List of Completed Graduate Students under My Supervision (University of Texas)

Student	Co-Supervisor	Degree	Start Date	Dissertation/ MS Thesis Date	Placement
A. R. M. Nabiul Afrooz		Ph.D.	08/2013 (*01/2013*)*	04/2015	Post Doc at Stanford University
Nirupam Aich		Ph.D.	01/2014 (*01/2013*)*	11/2015	Assistant Professor, Civil and Env Eng., State University of New York, Buffalo
Indu V. Sabaraya		M.S.E.	08/2014	05/2016	PhD student under my supervision
Lewis Stetson Rowles III	Desmond Lawler	M.S.E.	08/2014	05/2016	PhD student under my supervision

*indicates start date at University of South Carolina

Table 3. Summary of Academic Advising (University of South Carolina)

Metric	Value
Student Organizations Advised	
Undergraduates Supervised	4
PhD Students Completed *	1 (1 sole advisor)
MS Students Completed *	2.5 (2 sole advisor)

*count 1 if sole advisor, 0.5 if co-advised

Table 4. List of Completed Graduate Students under My Supervision (University of South Carolina)

Student	Co-Supervisor	Degree	Start Date	Dissertation/ MS Thesis Date	Placement
Iftheker A. Khan		PhD	01/2009	09/2012	Post Doc at University of Rhode Island
A. R. M. Nabiul Afrooz		MSE	01/2010	12/2012	PhD student under my supervision
Nirupam Aich		MS	01/2010	11/2012	PhD student under my supervision
Qammer Zaib	Yeomin Yoon	MS	08/2009	08/2011	PhD Candidate at Masdar Institute of Science and Technology, Abu Dhabi, United Arab Emirates

5. SERVICE TO THE UNIVERSITY AND TO THE NATION, STATE, AND COMMUNITY

Navid Saleh

Budget Council Statement
Prepared by Desmond F. Lawler and Lynn E. Katz

Dr. Saleh has done a quite significant amount of public service to the profession for an assistant professor; most of this has been associated with organizations that are closely tied to his research area of nanomaterials and the environment. He has organized several research sessions at national meetings of the American Chemical Society (ACS) over the past five years, been a reviewer of a large number of journal articles for a few different journals, and been a reviewer on three panels for NSF. He has recently been named an associate editor of *Environmental Science: Nano,* perhaps the leading journal of research on the environmental implications of engineered nanomaterials. While this level of service to the profession is not extraordinary, it certainly well exceeds the minimum standards we expect in our Department for assistant professors.

As noted elsewhere, Dr. Saleh also has made a serious commitment to the Navajo Nation. In addition to learning about some unique pottery skills and incorporating them into his own research on embedding silver nanoparticles into clay pots for the purpose of water disinfection, he has established an educational cooperation with two colleges that are primarily filled with Navajo students: San Juan College (SJC) in Farmington, NM and Navajo Technical University (NTU) in Crownpoint, NM. He has developed an ongoing relationship with these schools and has given lectures both in person and electronically to each; he expects this relationship to grow with time.

Dr. Saleh also worked closely with several students to write a successful"P3" (People, Prosperity, and the Planet) grant from the USEPA; this program is essentially a design competition program. The first grant is for $15K to get a project underway and, if the team can prove success in that initiation grant, they become eligible for larger implementation grants. One of us (DFL) had some involvement in the development of this grant, but Dr. Saleh took vastly more responsibility. That grant has been approved and will begin within the next few weeks after I write. We mention it here because this grant is essentially a service grant.

At the departmental level, we usually do not ask assistant professors for a high degree of committee work to allow them to establish their research presence in the field. We have followed that tradition with Dr. Saleh, but he has had reasonable involvement in committee work, His primary obligation in the few years since he joined our program has been with the Strategic Vision Implementation Committee (SVIC). The makeup of this group is primarily assistant and associate professors, since they are the ones whose vison will most likely effect our department in the long term. Dr. Saleh has been an active member of that group since its inception a few years ago.

Within EWRE, the task of carefully evaluating approximately 250 applications per year to the graduate program is a quite large one, and we have attempted over the years to spread that load among several faculty members. Dr. Saleh has jumped into this task and helped considerably the last two years, with a special interest in international applications. He has definitely done more than an equal share of this work for the EWRE program; that is, he has proven to be a "community-minded" person in the further development of EWRE, especially with respect to the graduate student population.

To summarize, Dr. Saleh has met and exceeded all the expectations that we have for an assistant professor for both internal and external service.

Service to the University, and to the Nation, State, and Community

Navid Saleh

I consider service to my institution as a way to integrate myself into the system as well as a portal to give back to the community that has allowed me to build my career. I believe community service is my responsibility as a professional and service to the nation and state is my duty.

Service to the University

During my time at The University of Texas at Austin (UT), my service to the University has been through the Department of Civil, Architectural and Environmental Engineering (CAEE). I consider myself to be extremely fortunate to be able to serve as an active member of the Strategic Vision Implementation Committee (SVIC) of CAEE. This committee is not only a platform to bring new ideas to shape CAEE's future, but also is a venue to learn more about the culture of our department as well as that of UT. During my first year of service as a member of SVIC, I have generated new ideas to enhance CAEE's reputation. My recommendations include producing publication databases for all faculty, developing faculty websites, and generating ideas to modernize the civil and environmental engineering discipline. My efforts on the SVIC committee also included closely working with my colleagues in the development of the new Sustainable Systems graduate program in CAEE. During one of the meetings at SVIC, I recommended providing a platform for undergraduate students to have closer interactions with CAEE faculty. One of the observations that SVIC made is that our students do not have enough student-faculty interaction beyond classroom contact hours and advising time where they can explore current research and practices in their discipline. I proposed that we host a congregation, 'Meeting of the CAEE Minds', where faculty members in one semester and students in the next can present posters on research and engineering practices. This event will enhance interaction between student and faculty and will benefit our undergraduates to take interest in their profession while making an informed decision when they choose their area of emphasis within CAEE.

In an effort to market our environmental engineering program in the engineering community as well as to serve our student community, I am organizing a workshop with my UT colleague Mary Jo Kirisits, which will take place in Fall 2016 at UT. The workshop will bring in nano-environmental and engineering ethics experts and will host a dialogue among them, where the experts, Dr. Kirisits, and I will discuss how to integrate social and ethical aspects of engineering into an engineering curriculum. Undergraduate and graduate students from UT, other Texas institutions, and from well-known environmental engineering programs across the nation will participate in the workshop. Students will have an opportunity to network with these experts as well as gain invaluable experience on pedagogical techniques. The workshop will host a session on problem-based pedagogical techniques, and afterwards we will have a working session with the students and experts. The goal of the working session is to develop problem-based modules that can be integrated into nano-environmental course(s) at UT and elsewhere. This workshop is one of my first attempts to highlight UT's research and educational efforts in the nano-environmental field, while providing a platform for students to gain exposure to modern teaching techniques.

In addition I have served the University in a few other ways. For instance, I have served in the Environmental and Water Resources Engineering seminar organization committee since Fall of 2015. I also have served as a marshal in the UT-wide ceremony for the Spring 2016 commencement.

Service to the Nation and State

I am an active member of several professional societies including the American Chemical Society (ACS), Sustainable Nano Organization (Sus Nano), and Association of Environmental Engineering and Science Professors (AEESP). I have organized numerous conference sessions for ACS (between 2012-2016) and Sus Nano (2015). The organization of these sessions has called for significant time commitment. I have invited speakers, reviewed the submitted abstracts, organized the sessions, and conducted the sessions at the conference venue. Organization of 8 such conference sessions has not only been an essential service activity but also has enhanced my reputation in the field. I also have been involved in organizing poster sessions and student activities at Sus Nano annual conferences and have plans to serve in the student activities committee of this organization during the 2016-2017 year. Furthermore, I have served in three National Science Foundation panels and have served as a reviewer for more than twenty high impact journals and have reviewed at least fifteen journal articles per year.

Recently, I have been invited to join as an editorial board member for a Royal Society of Chemistry journal, *Environmental Science: Nano*. Its impact factor (5.896) is the highest in the nano-environmental engineering field. As an editorial board member I am involved in reviewing articles, supplying advice locally to potential authors on writing and submission of papers, actively promoting the journal to potential authors and readers, providing feedback on community perception of the journal, and suggesting improvements.

To serve the state, I have taken an initiative that will have a tangible outcome. I have recently been funded by the Texas Hazardous Waste Research Center to develop an environmental health and safety (EHS) document to safely handle nanomaterials in laboratories at UT and elsewhere within the state of Texas. I am working closely with the EHS office at UT and have started working on development of this materials-handling guideline document and a safety-training module. Surveys to laboratories at UT, Texas A&M, Rice University, Texas Tech University, UT Pan America, and University of Houston, where nanomaterials are handled are now being designed. When completed, this document and training module will be one of the first in the nation and certainly the first in the state of Texas that will aid in ensuring student and researcher safety in this type of laboratory.

Service to the Community

My most notable community outreach has been to colleges and universities within the Navajo Nation. I have established a strong and unique outreach program with San Juan College (SJC) in Farmington, NM and Navajo Technical University (NTU) in Crownpoint, NM. More than 50% of the students at SJC and nearly 95% at NTU are of Native American heritage. I have presented seminars at SJC in June 2015 and will be presenting a seminar at NTU during Fall 2016. My goal is to perform research activities during summer (2017 and 2018) at both these colleges and present two to three lectures electronically at NTU during each semester. My research has already integrated Navajo traditional pottery techniques to develop point-of-use nano-enabled water treatment technology. Details of this project are described in my research statement. In this effort, I have been working with Navajo potter Dianna Tso, who will work with my group, SJC, and NTU to carry out educational and outreach activities among Native American students. This

outreach effort has been particularly rewarding, since most of these Native American students have little to no exposure to nanotechnology and environmental engineering.

Vision for the Future

I plan to fully integrate myself into UT's fabric by involving myself in college-wide and university-wide committees and meaningfully contributing to make the university environment even better. I also plan to serve the professional community more actively. Organization of the technical sessions in ACS and Sus Nano have allowed me to develop a professional network. I plan to actively serve these organizations as well as AEESP by formally engaging myself in committee responsibilities. I plan to continue serving the professional community by being available as a reviewer for journal articles and proposals. Finally, I will continue my outreach efforts at SJC and NTU. The point-of-use water treatment technology that I am developing in collaboration with my colleague Desmond Lawler and our co-advised graduate student Lewis Stetson Rowles III, will be implemented at the Navajo communities through SJC and NTU students and faculty involvement. This outreach effort follows Anne Mikelonis' (Des Lawler's former Ph.D. student) previous research on nano-enabled water treatment technology implementation in Africa. During the summer research activities at SJC and NTU, we will conduct surveys in the Navajo communities to gather information on their water use, current water treatment technologies at a household level (if any), and the attributes of a new treatment technology that will be acceptable to them. The students of these institutions will conduct the surveys on our behalf and thus will integrate themselves into the development of this technology. UT undergraduate and graduate students will present relevant research to SJC and NTU students and develop prototype treatment units with them (and Navajo potter Deanna Tso) that can be tested at their facilities. UT students will thus gain a unique experience on development and implementation of a real-life engineering solution. A new grant that has been funded (pending receipt of funding) by the Environmental Protection Agency will allow for implementation of our water treatment technology in an international setting, i.e., in Oaxaca, Mexico.

6. HONORS AND OTHER EVIDENCE OF MERIT OR RECOGNITION

Navid Saleh

Budget Council Statement
Prepared by Desmond F. Lawler and Lynn E. Katz

Dr. Saleh has won a major award within the past year—the Emerging Investigator Award, given jointly by the Sustainable Nanotechnology Organization and the Royal Society of Chemistry (England) *Environmental Science-Nano* journal. The award was given in recognition of Dr. Saleh's research contributions and commitment to educational efforts to expand the understanding of nanotechnology and the environment. This was only the second year of this award, and so one can assume that several young investigators who have been working in this field for the past 10 years or so would be eligible for this award; therefore, we believe that this recognition of Dr. Saleh represents a high degree of recognition.

The second major evidence of recognition for Dr. Saleh is that he is now an Associate Editor for the journal *Environmental Science: Nano.* The invitation to take on this role was made within the past six months and he has accepted this position. Although the field of nanotechnology and the environment is relatively young, this journal has emerged as perhaps the central journal for research in this field. To be asked to be an Associate Editor while still an Assistant Professor is a great recognition of Dr. Saleh, and followed his excellent reviewing of several papers for that journal in the previous few years.

Dr. Saleh also received a "best poster" award at the inaugural conference of the Sustainable Nanotechnology Organization. I (DFL) happened to be at that conference and met Dr. Saleh for the first time at the poster session! Although I had no role in the judging of posters, I can attest that it was indeed an excellent poster, and that he was highly capable of answering my questions about his work. Little did I imagine that he would be my colleague about 18 months later!

As noted elsewhere, Dr. Saleh's research has been highlighted on the cover of two different journals in the past few years: *Environmental Science: Nano* and *Environmental Chemistry.*

Throughout other parts of the Budget Council statement regarding Dr. Saleh's contributions, we have noted that he has been invited to organize sessions at several conferences and write major review articles; these invitations also represent recognition of Dr. Saleh's prominence and recognition within the field of the environmental implications of nanotechnology.

Honors and Other Evidences of Merit or Recognition

Navid Saleh

My group's scholarly research has been recognized via awards, honors, and grants. I have been invited to present a keynote lecture, numerous seminars, and to serve on the editorial board of a renowned nano-environmental journal. Ph.D. graduates from my group have obtained positions in well-known research groups as post-doctoral scholars and one of them is now a tenure track-track faculty member in a respected environmental engineering program.

Recognition via Publications and Awards:

My group's research has had a measurable impact as reflected by more than 4000 citations and an h-index of 23 (as per Google scholar). More than 100 citations for 11 of my papers (2 papers with more than 500 citations) reflect my work's impact in the field. In recognition of my impactful research and dedicated teaching I was awarded the '2015 Emerging Investigator Award' by the Royal Society of Chemistry's journal *Environmental Science: Nano* and the Sustainable Nanotechnology Organization. It is the most prestigious award that recognizes one or two rising stars in the field of nano-environmental engineering each year. This award selection is highly competitive. Approximately 10-12 highly productive researchers who were educated in the top departments and advised by some of the top experts in the field were nominated. The selection committee consisted of approximately five individuals who represent some of the best in the field. Upon my selection, the editor in chief of *Environmental Science: Nano* (the nano-environmental journal with highest impact factor, i.e., 5.896) Vicki Grassian stated, "Professor Saleh was selected because of his pioneering research contributions and his commitment to educating and engaging students in the field of sustainable nanotechnology."[1,2] The award came with a certificate and a $1,500 honorarium. High-impact independent research from my group since 2009 has a culminated in this prestigious award.

My group's research also has been recognized by a poster award at the Sustainable Nanotechnology Conference of 2012 as well as by numerous student awards. In April 2016, Erica Mason, an undergraduate researcher in my laboratory, won 1st place in the Women in Engineering poster competition at UT and 3rd place at the annual Poster Exhibition on Engineering Research (PEER) contest in the Cockrell School of Engineering. Nirupam Aich, a Ph.D. student under my supervision at the time, was awarded an American Chemical Society (ACS) Environmental Chemistry Graduate Student Award in 2014. It is a competitive national award, where only 15-20 students in environmental engineering are recognized each year.

Prior to my arrival at The University of Texas at Austin (UT), my group's research was recognized by exclusive profiling within the engineering college at University of South Carolina (USC). The College of Engineering and Computing at USC began an effort to highlight rising stars and prepared a leaflet with faculty profiles and their research accomplishments. My graduate students' research also was nationally recognized during that time. A. R. M. Nabiul Afrooz and Iftheker A. Khan received ACS Environmental Chemistry Graduate Student Awards in 2013 and 2011, respectively. Prior to my career as a faculty member, I was awarded multiple awards that recognized my teaching and research efforts. During my academic training at Carnegie Mellon University, I was awarded the Outstanding Teaching Assistant Award in 2007. I also received an ACS Environmental Chemistry Graduate Student Award in 2006 and the 2005-2006 Air & Waste Management Association (A&WMA) Award, both of which are extremely competitive national awards for environmental engineering graduate students.

Recognition via Grants

The research productivity of my group has attracted extramural funding from federal and state agencies, as well as industrial partners. During my tenure at UT, my group has received nine extramural research grants or contracts. I am the PI on eight of these projects. I have established a diverse research portfolio with grants or contracts funded by the National Science Foundation (4 grants), National Institutes of Health (1 grant), Environmental Protection Agency (2 grants), Texas Department of Transportation (1 contract), and Texas Hazardous Waste Research Center (1 grant). Funding has been steady in my research group since my time as an assistant professor at the University of South Carolina (USC). At USC, my group had received and successfully completed 5 extramurally funded projects, where I was the PI on 3 of those projects. The funding agencies included the National Science Foundation (2 grants), US Air Force Laboratory (1 contract), South Carolina Department of Transportation (1 contract), and Goldstar Engineering and Construction Co., South Korea (1 contract). I have been part of funded research projects amassing nearly $4M, of which ~$1.5M has been awarded to my research group. The cutting-edge fundamental research and new inventions in my laboratory promise to continue the funding stream in the coming years.

Other Recognition

My research expertise has been recognized in a variety of other ways. I have recently been invited to join the Editorial Board of the high impact nano-environmental engineering journal *Environmental Science: Nano*. I also have been invited to organize numerous technical sessions at national conferences (Sustainable Nanotechnology Organization Conference in 2014 and American Chemical Society (ACS) National meetings in 2015 and 2016). I gave an invited keynote lecture at the 89th ACS Colloid and Surface Science Symposium in 2015. Numerous other seminar invitations at top U.S. programs (e.g., University of Illinois, Rice University, Cornell University) serve as evidence of my national recognition. I have served as a panelist at the National Science Foundation on a number of occasions and have been a manuscript reviewer for top nanomaterials and environmental engineering journals (e.g., *Environmental Science and Technology*, *Environmental Science: Nano*, *Water Research*, *American Chemical Society Applied Materials and Interfaces*, *American Chemical Society Nano*, *Nanotoxicology*). My former graduate student Nirupam Aich is now in a tenure-track assistant professor position in a well-regarded environmental engineering program at State University of New York, Buffalo. A. R. M. Nabiul Afrooz, a former Ph.D. student under my supervision is a postdoctoral scholar in the NSF funded center (ReNUWIt) at Stanford University.

References:

1. Grassian, V. H. (2016). Environmental Science: Nano – immediacy index and more. *Environmental Science: Nano*. *3*, 234-235.

2. Palermo, C. (2015). SNO Emerging Investigator. *Environmental Science: Nano Blog*, 17 November, 2015 (URL: http://blogs.rsc.org/en/2015/11/17/2015-sno-emerging-investigator-2/).

LETTERS RECEIVED

A minimum of four review letters should be listed *alphabetically* with affiliation, etc.

Name of reviewer, rank or title, department, university	**Dr. Pedro Alvarez** George R. Brown Professor of Civil and Environmental Engineering Department of Civil and Environmental Engineering Rice University
Brief statement of expertise and reason for selection*	Dr. Alvarez's research focuses on environmental sustainability through bioremediation of contaminated aquifers, fate and transport of toxic chemicals, the water footprint of biofuels, microbial-plant interactions, water treatment and reuse, and environmental implications and applications of nanotechnology. He is the Director of the Nanotechnology Enabled Water Treatment (NEWT) NSF Engineering Research Center, the 2012 Clarke Prize recipient and the recipient of the 2014 AAEES Grand Prize for Excellence in Environmental Engineering and Science. He is a Diplomat of the American Academy of Environmental Engineers, a Fellow of AAAS, ASCE, IWA, WEF and the Leopold Leadership Foundation, and a founding member of the Nicaraguan Academy of Sciences.
Other relevant information**	Dr. Alvarez and Dr. Saleh have not had any research collaborations. Dr. Alvarez invited Dr. Saleh to present a seminar at Rice University in the past year.
Nominated by	Candidate
Date letter received	6/23/2016

Name of reviewer, rank or title, department, university	**Dr. Mark M. Benjamin** Professor Department of Civil and Environmental Engineering University of Washington
Brief statement of expertise and reason for selection*	Dr. Benjamin is an expert in physical/ chemical treatment processes in general, with long-term research interests in the behavior of natural organic matter (NOM) and its removal from potable water sources, and in the development of adsorption-based processes for removal of metals, NOM, and other contaminants from solutions. For the past several years, a major focus of Dr. Benjamin's work has been membrane treatment of drinking water, and in particular approaches for interfering with membrane fouling by NOM. Dr. Benjamin was the "Distinguished Lecturer" of the Association of Environmental Engineering Professors in 2009-10. Dr. Benjamin is the author of a textbook on Water Chemistry and is the co-author (with UT faculty member Desmond Lawler) of a textbook on Water Quality Engineering
Other relevant information**	Dr. Benjamin has never met Dr. Saleh.
Nominated by	Budget Council
Date letter received	6/2/2016

Name of reviewer, rank or title, department, university	**Dr. Kim Hayes** Professor and Donald Malloure Department Chair Department of Civil and Environmental Engineering University of Michigan
Brief statement of expertise and reason for selection*	Dr. Hayes is the Arthur J. Decker Collegiate Professor of Civil and Environmental Engineering at the University of Michigan. His research expertise encompasses several areas including characterization of metal ion sorption to a variety of materials (e.g. nanoparticles and soil minerals) application of surfactants to groundwater remediation, water treatment and purification using nanotechnology, industrial ecology and green chemistry, and biogeochemical transformation of contaminants. He has received a number awards for his research including the 2007 AEESP Outstanding Paper Award and the 2004

*Provide additional detail for any reviewer not at a peer institution

** Provide explanation for any reviewer not at arm's length.

	Distinguished Faculty Achievement Award from the University of Michigan.
Other relevant information**	Dr. Saleh does not know Dr. Hayes personally.
Nominated by	Budget Council
Date letter received	7/14/2016

Name of reviewer, rank or title, department, university	**Dr. Michael F. Hochella** University Distinguished Professor and Director of the Virginia Tech National Center for Earth and Environmental Nanotechnology Infrastructure Department of Geosciences Virginia Polytechnic Institute and University
Brief statement of expertise and reason for selection*	Dr. Hochella's expertise is in elucidating the role that nanoscience and mineral surface geochemistry/ biogeochemistry plays in environmental issues and biogeochemical cycling of the elements. His research also addresses mineral - microbe interactions from both geochemical and biochemical perspectives, including their impact on the fate and mobility of nutrients and toxins in the environment. He has been a Fulbright Scholar, a Humboldt Award winner, and Virginia Scientist of the Year. He is a fellow of six international scientific societies including AGU and AAAS, a Dana Medal winner (Mineralogical Society of America), and a former President of the Geochemical Society and the Mineralogical Society of America. He has also won the Brindley Lecture Award (Clay Minerals Society) and the Distinguished Service Medal of the Geochemical Society.
Other relevant information**	Dr. Saleh has not collaborated with Dr. Hochella, but they know each other through attendance at the same meetings.
Nominated by	Candidate
Date letter received	7/13/2016

Name of reviewer, rank or title, department, university	**Dr. Jaehong Kim** Professor and Chair Department of Chemical and Environmental Engineering Yale University
Brief statement of expertise and reason for selection*	Dr. Kim's research expertise is in environmental implications of nanomaterials and synthesis of nanomaterials for water treatment. He has received numerous awards for his research including the Walter L. Huber Civil Engineering Research Prize from ASCE and the Paul L. Bush Award from the Water Environment Research Foundation. He is an elected member of the Connecticut Academy of Science and Engineering, serves on the Editorial Advisory Board of Environmental Science and Technology Letters and was Associate Editor of the ASCE Journal of Environmental Engineering and Water Research.
Other relevant information**	Dr. Kim has not collaborated with Dr. Saleh. He knows him through interactions at professional meetings, and he was not a faculty member at Yale when Dr. Saleh was a post-doc at Yale with Dr. Elimelech.
Nominated by	Candidate
Date letter received	6/1/2016

Name of reviewer, rank or title, department, university	**Dr. Richard G. Luthy** Silas H. Palmer Professor Department of Civil and Environmental Engineering Stanford University
Brief statement of	Besides his academic appointment in the Department of Civil and Environmental

*Provide additional detail for any reviewer not at a peer institution

** Provide explanation for any reviewer not at arm's length.

expertise and reason for selection*	Engineering, Dick Luthy is a Senior Fellow in the Woods Institute for the Environment at Stanford. His area of teaching and research is environmental engineering and water quality. He is the Director of the National Science Foundation's Engineering Research Center for re-inventing the nation's urban water infrastructure (renuwit.org) that promotes new strategies for urban water systems to achieve more sustainable solutions to urban water challenges - especially in regions experiencing chronic water shortages and vulnerabilities to cycles of very low precipitation like the American west and southwest. Dr. Luthy is a member of the National Academy of Engineering.
Other relevant information**	Dr. Saleh has not collaborated with Dr. Luthy. They have met at conferences and Dr. Saleh hosted Dr. Luthy at the University of South Carolina.
Nominated by	Candidate
Date letter received	6/23/2016

Name of reviewer, rank or title, department, university	**Dr. Benito Mariñas** Department Head Ivan Racheff Professor of Environmental Engineering Department of Civil and Environmental Engineering University of Illinois at Urbana-Champaign
Brief statement of expertise and reason for selection*	Dr. Mariñas has research interests in various mechanistic aspects of chemical and ultraviolet light disinfection processes and membrane technologies for the particular application of controlling waterborne pathogens. He is also developing hybrid adsorption/membrane processes for the control of pesticides, taste-and-odor-causing compounds and other water contaminants, and working on research projects aimed at elucidating the mechanisms responsible for the formation of disinfection by-products of health concern in drinking water.
Other relevant information**	Dr. Saleh gave an invited talk at the University of Illinois and met Dr. Mariñas on that occasion. They have not collaborated in any way.
Nominated by	Budget Council
Date letter received	7/18/2016

Name of reviewer, rank or title, department, university	**Dr. David L. Sedlak** Plato Malozemoff Professor, Co-director of Berkeley Water Center and Director of Institute for Environmental Science and Engineering Department of Civil and Environmental Engineering University of California –Berkeley
Brief statement of expertise and reason for selection*	Professor Sedlak's research focuses on fate of chemical contaminants, with the long-term goal of developing cost-effective, safe, and sustainable systems to manage water resources. He is particularly interested in the development of local sources of water. His research has addressed water reuse--the practice of using municipal wastewater effluent to sustain aquatic ecosystems and augment drinking water supplies--as well as the treatment and use of urban runoff. Dr. Sedlak is a member of the National Academy of Engineering, a recipient of the Clarke Prize given by the National Water Resources Institute, and chief editor of the ACS Journal *Environmental Science and Technology*. At Berkeley, he is the Co-director of the Berkeley Water Center, Director of the Institute for Environmental Science and Engineering, and Deputy Director of the NSF Engineering Research Center ReNUWiT that is at Stanford, Berkeley, and the Colorado School of Mines.
Other relevant information**	Dr. Saleh knows Dr. Sedlak only through conferences.
Nominated by	Budget Council
Date letter received	7/16/216

*Provide additional detail for any reviewer not at a peer institution

** Provide explanation for any reviewer not at arm's length.

COCKRELL SCHOOL OF ENGINEERING
THE UNIVERSITY OF TEXAS AT AUSTIN

Department of Civil, Architectural and Environmental Engineering • ECJ 4.200
301 E. Dean Keeton St STOP C 1700 • Austin, Texas 78712-1056 • (512) 471-4921 • Fax (512) 471-0592

May 27, 2016

Dr. Benito Mariñas
Department Head
Ivan Racheff Professor of Environmental Engineering
Department of Civil and Environmental Engineering
University of Illinois at Urbana-Champaign

Dear Dr. Mariñas:

The Department of Civil, Architectural and Environmental Engineering is considering Dr. Navid Saleh for tenure and advancement in rank to the position of associate professor at the University of Texas at Austin. We would appreciate your candid assessment of his scholarly contributions to assist our decision-making process. Excellent teaching is an important criterion for promotion, but our evaluation of teaching is being carried out separately, and we are asking you only for information about his scholarly distinction. Copies of Dr. Saleh's curriculum vitae and several recent papers are enclosed for your review.

We would appreciate your opinions regarding Dr. Saleh's major engineering and/or scientific contributions. In preparing your assessment, please consider the following questions:

1. Do you know Dr. Saleh, and if so, for how long and under what circumstances?
2. What are the original, innovative, and/or important contributions that he has made in his field of research? Have his publications influenced the thinking of, or the methods used by, others in your field?
3. How would you assess Dr. Saleh's development compared with others in his cohort at research-intensive universities?
4. What is your perspective on Dr. Saleh's promise for further professional growth and leadership?

We would be grateful for any additional comments you might have. The more specific you can be in your comments, the more helpful your evaluation will be.

Under the laws of the State of Texas, Dr. Saleh has the right to request to see any materials in his personnel file, including your letter. Members of our faculty and internal review committees who see your letter as part of the promotion process will hold the comments you make in confidence, however.

For your comments to receive full consideration, we will need to receive a signed letter from you no later than July 15, 2016. It is not necessary for you to send us a hard copy of your letter, an electronic or scanned version is sufficient, provided your institutional letterhead and your signature are included. In addition, please enclose a copy of a short version of your curriculum vitae (preferably no longer than two pages) or the URL for your web site where we may obtain this information. If you have questions, please call me at the number given on the letterhead.

Thank you for your time and assistance with this important matter. As faculty members, we realize that the amount of time required to do a thoughtful review is considerable.

With sincere appreciation,

Richard L. Corsi, Ph.D., P.E.
Chair & ECH Bantel Professor for Professional Practice
Member, UT Academy of Distinguished Teachers
Department of Civil, Architectural & Environmental Engineering
CAEE website: http://www.caee.utexas.edu/

FIVE SIGNIFICANT PUBLICATIONS:

** indicates supervised student(s)*

1. *Afrooz, A. R. M. N., *Khan, I. A., Hussain, S. M., Saleh, N. B. (2013). Mechanistic heteroaggregation of gold nanoparticles in a wide range of solution chemistry. *Environmental Science and Technology. 47 (4)*, 1853-1860.
2. *Khan, I. A., *Afrooz, A. R. M. N., Flora, J. R. V., Schierz, P. A., Ferguson, P. L., Sabo-Attwood, T., Saleh, N. B. (2013). Chirality affects aggregation kinetics of single-walled carbon nanotubes. *Environmental Science and Technology. 47 (4)*, 1844-1852.
3. Chambers, B. A., *Afrooz, A. R. M. N., Bae, S., *Aich, N., Katz, L., Saleh, N. B., Kirisits, M. J. (2014). Effects of Chloride and Ionic Strength on Physical Morphology, Dissolution, and Bacterial Toxicity of Silver Nanoparticles. *Environmental Science and Technology. 48 (1)*, 761-769.
4. *Aich, N., Boateng, L. K., *Sabaraya, I. V., *Das, D., Flora, J. R. V., Saleh, N. B. (2016). Aggregation Kinetics of Higher Order Fullerene Clusters in Aquatic Systems. *Environmental Science and Technology. 50 (7)*, 3562-3571.
5. *Afrooz, A. R. M. N., *Das, D., Murphy, C. J., Vikesland, P. J., Saleh, N. B. (2016). Co-transport of gold nanospheres with single-walled carbon nanotubes in saturated porous media. *Water Research. 99*, 7-15.

Candidate

Pedro J. Alvarez, Ph.D., P.E., DEE
George R. Brown Professor of
Civil & Environmental Engineering
Rice University – MS 6398
Houston, TX 77251-1892
P: 713.348-5903 F: 713.348-5268
Email: alvarez@rice.edu

27 May 2016

Dr. Richard L. Corsi, Ph.D., P.E.
Chair & ECH Bantel Professor for Professional Practice
Department of Civil, Architectural & Environmental Engineering
University of Texas at Austin
Austin, TX 78712-0273

Dear Dr. Corsi,

It was my distinct pleasure to review the scholarly work of Dr. **Naved Saleh**, who is being considered for promotion to Associate Professor with tenure in your Department. By way of introduction, I am the George R. Brown Professor of Engineering at Rice University, where I also serve as director of the NSF Engineering Research Center on Nanotechnology-Enabled Water Treatment (NEWT). My research recognitions include the 2012 Clarke Prize laureate, the 2014 AAEES Grand Prize for Excellence in Environmental Engineering and Science, the Malcolm Pirnie-AEESP Frontiers in Research Award, the WEF McKee Medal for Groundwater Protection, the SERDP cleanup project of the year, and various best paper awards with his students. Similar to Naved, I conduct research on environmental nanotechnology. As Associate Editor for *Environmental Science and Technology*, which is one the most rigorous journals for environmental engineering, I have also handled several of his papers. Therefore, I am well qualified to comment on the high quality of his research and his significant contributions towards safer and more sustainable nanotechnology.

I have followed Naved's work since he was a Ph.D. student at Carnegie Mellon, working with engineered nanomaterials. At that time there was significant concern that the increasing production of nanomaterials and their rapid incorporation into a variety of consumer products and applications was outpacing the development of appropriate information and regulations to mitigate potential risks associated with their release to the environment. This motivated Naved to focus on enhancing risk assessment by advancing our understanding of how nanomaterials behave in the environment and how they interact with living organisms. Amongst his salient contributions in this field include discerning the mode of action for oxidative stress and neurotoxicity of TiO2 nanoparticles, and the characterization of factors that influence the stability and aggregation of nanoparticles in the environment. This latter work was important not only to assess potential exposure but also to understand fate and transport of nanoparticles used for groundwater remediation, such as nano-scale zero-valent iron. Currently, Naved is broadly recognized as a leading expert on the environmental implications of carbon-based nanomaterials (e.g., single-walled carbon nanotubes) and nano-hybrids, including assessment of their fate, transport and potential toxicity. He is also beginning to develop safe and effective nano-enabled technologies for water treatment, which is a fertile area of research.

Naved's scholarly productivity is excellent in terms of both quantity and quality, with 37 papers published in rigorous journals. Since his arrival at UT Austin in 2014, he has published an average of 10 papers per year, which is a very high rate reflective of his exceptional productivity. The citations report from Google Scholar reflects a very high level of impact. Naved has an h index of 23 (i.e., he has 23 papers that were cited at least 23 times), which is very high for someone who graduated only 9 years ago and has been a faculty member for just 7 years. A common rule of thumb to interpret h factors in environmental engineering academia is to compare this value to the number of years since obtaining a PhD. Those with h factors equal or larger than the number years since graduation are doing well. In his case, the h factor is 2.6 times higher than the number of years since graduation and is commensurate with that of some scholars being promoted to the rank of full professor at major research universities.

Naved's funding record is also meritorious of promotion, demonstrating his capacity to get competitive grants and reflecting independence, collaborative nature, and ability to support his graduate students. He also has demonstrated strong productivity related to training doctoral and postdoctoral students. Overall, he is contributing to the distinction of your outstanding department and has my enthusiastic recommendation for promotion. Please feel free to contact me if you would like any additional comments or information.

Sincerely,

Pedro J. Alvarez, Ph.D., P.E., DEE
George R. Brown Professor of Civil and Environmental Engineering

Candidate

From: Pedro Alvarez
To: Peoples, Hortensia D
Subject: RE: On Behalf of Richard L. Corsi-- Letter of Reference Request for Dr. Navid Saleh
Date: Friday, May 27, 2016 2:30:09 PM
Attachments: Navid Saleh.pdf

Back to you

Pedro J. Alvarez, Ph.D., P.E., BCEE
George R. Brown Professor of Civil and Environmental Engineering
Director, NSF ERC on Nanotechnology-Enabled Water Treatment (NEWT)
Rice University
6100 Main St.
MS 6398
(Physical address: 262 Mech lab)
Houston, TX 77005
Phone: (713) 348 5903
Fax: (713) 348 5268
http://www.alvarez.rice.edu

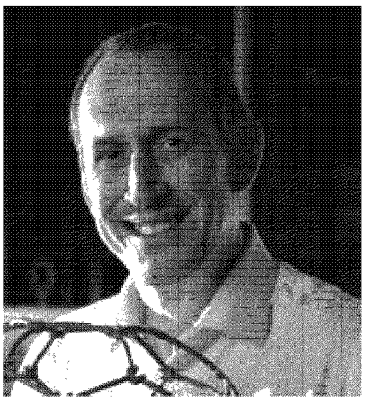
From: Peoples, Hortensia D [mailto:hpeoples@mail.utexas.edu]
Sent: Friday, May 27, 2016 9:46 AM
To: alvarez@rice.edu
Subject: On Behalf of Richard L. Corsi-- Letter of Reference Request for Dr. Navid Saleh
Importance: High

Dr. Alvarez:

The Department of Civil, Architectural and Environmental Engineering at the University of Texas at Austin is considering Dr. Navid Saleh for promotion to Associate Professor. As part of this process, we would appreciate if you would provide your candid assessment of his scholarly contributions. I have attached electronic copies of our formal letter, Dr. Saleh's current CV, and five of his papers. If you would like to receive any other information, or a hard copy of the documents, please let me know.

We would appreciate receiving your letter by *July 15, 2016*. Thank you in advance for your assessment.

With sincere appreciation,
Richard L. Corsi, Ph.D., P.E.
Chair & ECH Bantel Professor for Professional Practice
Member, UT Academy of Distinguished Teachers
Department of Civil, Architectural & Environmental Engineering
CAEE website: http://www.caee.utexas.edu/
CAEE Twitter: @UT_CAEE



PEDRO J. J. ALVAREZ

Rice University

Dept. of Civil & Environmental Engineering
Dept. of Chemistry

alvarez@rice.edu
(713) 348-5903

Education

- B.Eng. 1982 Civil Engineering McGill University, Montréal
- Certif. 1988 Haz. Waste Mgmt. U. of California, Riverside
- M.S.E 1989 Environmental Engrg. University of Michigan, Ann Arbor
- Ph.D. 1992 Environmental Engrg. University of Michigan, Ann Arbor

Biography

Dr. Pedro J. J. Alvarez is the George R. Brown Professor of Civil and Environmental Engineering at Rice University, where he also serves as Director of the NSF ERC on Nanotechnology-Enabled Water Treatment (NEWT). His research interests include environmental applications and implications of nanotechnology, bioremediation of toxic chemicals, water footprint of biofuels, water treatment and reuse, and antibiotic resistance control.

Dr. Alvarez received the B. Eng. Degree in Civil Engineering from McGill University and MS and Ph.D. degrees in Environmental Engineering from the University of Michigan. He is the 2012 Clarke Prize laureate and also won the 2014 AAEES Grand Prize for Excellence in Environmental Engineering and Science. Past honors include President of AEESP, the AEESP Frontiers in Research Award, the WEF McKee Medal for Groundwater Protection, the SERDP cleanup project of the year award, and various best paper awards with his students.

Dr. Alvarez currently serves on the advisory board of NSF Engineering Directorate and as Associate Editor of *Environmental Science and Technology*. Additionally, he serves as honorary professor at Nankai University in Tianjin and the Chinese Academy of Sciences in Beijing, China, and as adjunct professor at the Universidade Federal de Santa Catarina in Florianopolis, Brazil. He recently completed service on the EPA's Science Advisory Board.

Positions

2015-present Directory, NEWT ERC Rice University, Houston, TX

2004-present G.R. Brown Professor Rice University, Houston, TX

2004-2015 CEE Dept. Chair Rice University, Houston, TX

2001-2003 Professor The University of Iowa, Iowa City

1999 Visiting Professor EAWAG, Switzerland

1998-2003 Associate Director Center for Biocatalysis & Bioprocessing

1997-2001 Associate Professor The University of Iowa, Iowa City

1993-1997 Assistant Professor The University of Iowa, Iowa City

1985-1988 Environ. Engineer Tetratech Inc., San Bernardino, CA

Selected Activities

- Registered Professional Engineer, Michigan License # 35419, Iowa License # 12575, Texas License # 95255; Registered Groundwater Professional, Iowa # 1681
- Conference chair, Leading Edge Technologies, International Water Association (IWA), 7/11 (Amsterdam) and 7/10 (Phoenix).
- Delegate to COP15 (Global Climate Forum in Copenhagen), 12/09
- Member, CLEANER Committee, National Research Council (NRC)
- Member, Academic Relations Committee, Water Environment Federation (WEF)
- Member, Publications Committee, American Academy of Environ. Engineers (AAEE)
- Member, Hazard Assessment and Control of Toxic Substances in Water Committee, also Nanomaterials in the Environment Committee; IWA, 7/00-present.
- Panel member, NCEES Environmental Engrg. minimum competency requirements, 11/04.
- International Expert Committee for the Mexican Institute of Petroleum for the evaluation of projects of the Biotechnology Program on Petroleum, 2/00-2/04.
- AWWARF Project Advisory Committee, 1998, 2010
- Advisor to the State of Iowa, Brownfields Committee,1997, and Underground Storage Tank Interim Study Committee, 1993, 1995.
- Consultant, Government of the Commonwealth of Dominica, Roseau, 1991(Assisted in formulation of environmental policies for economic growth)
- Consultant, The City of Ann Arbor, MI, 1991(Designed and implemented a landfill groundwater monitoring plan)

UNIVERSITY of WASHINGTON
CIVIL & ENVIRONMENTAL ENGINEERING

June 2, 2016

I am pleased to offer my assessment of Dr. Navid Saleh's professional record in support of his consideration for promotion to Associate Professor with tenure. I do not know Dr. Saleh and, although I have a basic understanding of the field in which he works, I am not an expert in that field. As a result, I cannot offer a very substantive evaluation of the impact of his research or its significance in advancing the state of the art. I can, however, review his record in a general way from my perspective as someone who has been in a CEE Department at a major research university for almost 40 years.

As you are aware, by the raw numbers, Professor Saleh's performance has been exemplary. With approximately 50 publications in press or under review, most in top-notch journals, and an H-factor of 23, he is far over the bar for promotion with respect to research output. Many of these publications have six or more co-authors, including two or three faculty members, which is unusual in my experience but might be more common in the nanomaterials world. However, even if one "discounts" the total number of publications in some way to account for this factor (which I do not advocate, but a consideration that almost invariably comes up for discussion in cases like this), Professor Saleh's publication record is unimpeachably strong.

As noted above, I am not an expert in nanomaterials, but I did read the five publications that were sent with his dossier, and I found them to be well-written, interesting and rigorous. They made a convincing case for the relevance of the research, used multiple sophisticated analytical tools to characterize the properties and interactions among the particles of interest, and in several cases integrated fundamental theoretical analysis with experimental observations. The papers were clearly linked in terms of the types of questions being asked and the tools used in the investigations, but they also followed a logical and interesting intellectual progression from primarily physical interactions among the nanoparticles to incorporation of more chemical processes (in the paper on silver nanoparticles) and from batch systems to a system incorporating flow through porous media.

In addition to his publications in the archival literature, Professor Saleh's record is very good, indeed exemplary, with respect to the other traditional metrics of scholarly productivity. He and his students have presented his research frequently at prestigious conferences, so I am confident that his work is familiar to and respected by his peers; he has maintained steady funding throughout his career to date, including several highly competitive grants from NSF; and, for his career stage, he has mentored and is mentoring an appropriate number of research students. He also has contributed to the profession through his activities organizing symposia at professional meetings and is engaged in Departmental and University affairs an appropriate level.

All in all, it appears that Professor Saleh is well on his way to a highly successful academic career, and I support his promotion fully (keeping in mind the caveats mentioned at the beginning of this letter regarding my limited ability to assess the impact of his technical contributions). Please feel free to contact me should you need any additional information.

Sincerely,

Mark M Benjamin

Mark M. Benjamin
Professor of Civil and
Environmental Engineering

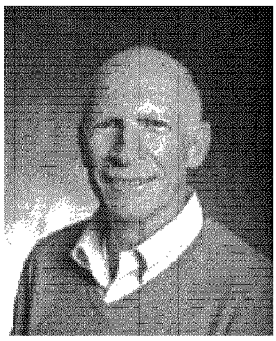
Budget Council

From: Mark Benjamin
To: Peoples, Hortensia D
Cc: Corsi, Richard L
Subject: RE: On Behalf of Richard L. Corsi-- Letter of Reference Request for Dr. Navid Saleh
Date: Tuesday, May 31, 2016 12:08:48 PM
Attachments: Saleh promotion UT.docx

Attached please find my reference letter for Dr. Saleh's promotion case.

All the best.

Mark Benjamin



Mark M. Benjamin

University of Washington
Environmental Engineering

markbenj@uw.edu
Phone: (206) 543-7645

Education

PhD, Stanford University, Civil Engineering, 1978
MS, Stanford University, Chemical Engineering, 1973
BS, Carnegie-Mellon University, Chemical Eng, 1972

Biography

Mark Benjamin joined the UW CEE faculty in 1977, after earning his B.S. in Chemical Engineering from Carnegie-Mellon University in 1972, his M.S. in Chemical Engineering from Stanford University in 1973, and his Ph.D. in Environmental Engineering from Stanford University in 1978. Dr. Benjamin is an expert in physical/ chemical treatment processes in general, with long-term research interests in the behavior of natural organic matter (NOM) and its removal from potable water sources, and in the development of adsorption-based processes for removal of metals, NOM, and other contaminants from solutions.

For the past 13 years, a major focus of Dr. Benjamin's work has been membrane treatment of drinking water, and in particular approaches for interfering with membrane fouling by NOM. In addition to the topics noted above, Dr. Benjamin has published research on conventional coagulation and filtration processes, diffusion dialysis, and mineral dissolution kinetics. His work has been recognized by a Fulbright fellowship and several awards for best publications in various journals, and three of his students have won awards for best doctoral thesis in environmental engineering.

In addition to his research activities, Dr. Benjamin has served on the Board of Directors of AEESP and written a widely adopted graduate-level textbook on Water Chemistry (McGraw-Hill, 2002), and he is preparing another text on Physical-Chemical Treatment of Water with Professor Desmond Lawler of the University of Texas. He has twice held five-year appointments to endowed Chairs, and was selected as the AEESP Distinguished Lecturer for 2009-10.He has been one of two faculty co-advisors for the UW chapter of Engineers Without Borders (EWB) since its inception in 2005.

Professional History

Professor, Department of Civil Engineering, Environmental Engineering & Science Program, University of Washington, Seattle, WA; 1989-present.

Associate Professor, Department of Civil Engineering, Environmental Engineering & Science Program, University of Washington. Seattle, WA, 1983-1989.

Assistant Professor, Department of Civil Engineering, Environmental Engineering & Science Program, University of Washington, Seattle, WA, 1978-1983.

Visiting Professor, Department of Chemistry, University of Costa Rica, San Jose, Costa Rica, 1985-1986.

Visiting Professor, Department of Environmental Sciences, Hebrew University, Jerusalem, Israel, 1992-1993.

Visiting Professor, Department of Civil and Environmental Engineering, University of New South Wales, Sydney, Australia, 2000.

UNIVERSITY OF MICHIGAN
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

Budget Council

Date: July 14, 2016

Richard L. Corsi, Ph.D., P.E.
Chair & ECH Bantel Professor for Professional Practice,
Member, UT Academy of Distinguished Teachers
Department of Civil, Architectural & Environmental Engineering
CAEE website: http://www.caee.utexas.edu/

Dear Richard,

This letter is in response to your request for my evaluation of Dr. Navid Saleh's scholarly record in consideration of his tenure and promotion to Associate Professor in Department of Civil and Environmental Engineering (CEE) at the University of Texas at Austin. By way of background, I am a Professor and Chair of Civil and Environmental Engineering (CEE) Department at the University of Michigan UM). In this capacity, and as a past elected member of the College of Engineering's Executive Committee, I have reviewed many casebooks in consideration of P&T at UM and for other universities. My general area of research expertise is in environmental chemistry and engineering, with specialization in water quality engineering, and the fate, transport and removal of environmental contaminants in aquatic systems. Dr. Saleh and I share a common research interest in the use of nanoparticles for treating impaired water. Until I received your request, I was not familiar with Dr. Saleh's work, nor do I recall having or heard him present at national or international meetings. This is not surprising, however, given the different emphasis of our respective research programs, with mine including a broad suite of investigations of physical-chemical processes in water quality and water treatment, groundwater remediation and contaminant fate and transport, and Dr. Saleh's primarily focused on the characterization of the behavior of engineered nanomaterials in water treatment applications.

That said, my initial impression from a quick read of Dr. Saleh's CV is that he is a very productive and emerging leader in his field, and specifically in characterizing engineered nanomaterials (ENMs) for their potential water treatment applications, and for assessing the impacts of solution conditions on their aggregation and dispersion properties. My comments below, based on a more thorough review of his research accomplishments to date, including the five papers of his you sent to me, reinforce my initial positive assessment.

You mentioned in your correspondence that would like my opinions regarding Dr. Saleh's major engineering and/or scientific contributions, and in doing so to consider the questions you asked me to address in your cover letter to me. As such, my responses are organized per the questions you poised.

1. Do you know Dr. Saleh, and if so, for how long and under what circumstances?

Before being sent his CV and selected papers, I did not know of Dr. Saleh's work, but this is more a result of the differences in emphasis of our research focus areas, the different conference sessions we attend, and my more recent administrative focus in my position as Chair for the past 5 years. Based on the materials you sent, I am confident that Dr. Saleh is performing cutting-edge research on ENMs pertaining to their properties that make them suitable for potential water

quality applications and reduced health risk. In short, Dr Saleh is building an exceptional record of scholarly accomplishments that bodes well for his future success.

2. **What are the original, innovative, and/or important contributions that he has made in his field of research? Have his publications influenced the thinking of, or the methods used by, others in your field?**

From the five papers I was sent (SC-15, SC-16, SC-23, UT-13, UT-14 as listed in his CV), a clear and consistent picture emerges from Dr. Saleh's body of work to date. In particular, as evidenced from papers SC-15, SC-16, and UT-13, he is expert in applying state-of-the-art surface characterization tools for investigating the properties of ENMs that give them their unusual reactivity or control their fate in aquatic environments. Combined with his theoretical knowledge and application of DLVO theories to particle aggregation kinetics, he has been able to perform studies and glean mechanisms that establish him as one of the younger leaders in this field. For example, in paper SC-15, he has shown his considerable experimental capabilities in applying a suite characterization tools such as UV−Vis, Raman Spectroscopy, transmission electron microscopy (TEM), time-resolved dynamic light scattering (TRDLS), and electrophoretic mobility (EPM) measurements for assessing the rate and mechanism of hetero-aggregation of two ENMs (e.g., pluronic acid (PA) modified single-walled carbon nanotubes (PA-SWNTs) and gold nanosphere, AuNS). And likewise in paper SC-16, he has used to great affect near-infrared spectroscopy, X-ray photoelectron spectroscopy, Raman Spectroscopy, TEM, and EPM measurements, in combination with DLVO theory, for illustrating the impacts of chirality on the aggregation kinetics of two different SWNTs. Similarly in UT-13 he has shed new light on the rates and of the aggregation and dispersion behavior of higher order fullerene clusters (HOF).These three studies illustrate his excellent command of state-of-the-art approaches for performing homo- and hetero-aggregation rate studies and determining fundamental mechanisms. I would imagine that these approaches, if not already, will become the "standard" for those wishing to establish ENMs aggregation mechanisms under the complex solution conditions found in water treatment applications, or by those wishing to verify the key EMNs properties that control their safety, fate and transport in the natural environment.

His other two papers included in the dossier (SC-23, UT-14) portend a future that will move Dr. Saleh's from what to date have been well-designed fundamental investigations of model ENMs properties and aggregation under simple solution conditions, to studies of ENMs under more complex and realistic conditions. This includes the elegant study of the impact of a wide range of solution conditions, including detailed Ag aqueous speciation identification, on the morphology, dissolution, and toxicity of silver nanospheres (AgNSs) in paper SC-23, and the transport behavior of gold nanospheres (AuNs) and SWCNs in saturated porous media over a range of conditions in paper UT-14. As such, Dr. Saleh is strategically positioned to further lead the way in demonstrating under what conditions applications of ENMs will be feasible in water quality applications, and subsequently, what conditions will minimize potential unwanted mobilization or minimize health risks of ENMs once their water treatment function has been served. I am also especially intrigued by the topic of a recent paper submission (UT-16 in revision), in which he is working on developing combined ENM systems for creating reactive oxygen species for water disinfection.

To date, his three papers from his work performed at University of South Carolina, SC-15, SC-16, and SC-23, have been cited 26, 18, and 18 times, respectively, according to Science Citation Index (SCI), which is an early indicator that as an Assistant Professor he is beginning to be recognized by the ENMs research community, even though this work has been in the published literature for only a short period of time (since 2013-14). That said, his earlier Ph.D. and Postdoctoral work, co-authored with his well-known advisers, Drs. Lowry and Elimelech (papers GP-1 –GP-12 over the period of 2005 to 2009), have collectively been relatively highly cited (>2500 times, SCI). Combined, these citation numbers indicate Dr. Saleh's body of work is having impact on the community of researchers in his field of expertise. His receiving the Emerging Investigator Award in 2015 from the Royal Society of Chemistry and Sustainable Nanotechnology Organization is also consistent with his growing reputation in the field.

3. **How would you assess Dr. Saleh's development compared with others in his cohort at research-intensive universities?**

By almost any quantitative measure, the body of work complied by Dr. Saleh is impressive in an absolute sense and in comparison to others from highly-regarded research-intensive institutions at a similar career stage. Also, the quality of journals he has selected to publish his work are generally quite strong, with many of his publications appearing in premiere journals in his field (e.g., *Environmental Science-Nano* (Impact Factor, IF: 5.896); *Water Research* (IF: 5.991); *Environmental Science and Technology* (IF: 5.393); *Journal of Hazardous Materials* (IF: 4.836); *Langmuir* (IF: 3.993); *Nanotechnology* (IF: 3.573), and with some in newer quality but less established journals, e.g., *Nanomaterials* (IF: 2.690), *Environmental Chemistry* (IF: 2.445), and *Journal of Nanoscience and Technology* (IF: 1.338). He has also published nearly all of his work, both the University of South Carolina (21 out of 23) and University of Texas at Austin (13 out of 14), with his students as co-authors, indicating his advisees are contributing to nearly all of his published work, a sign that he and his students are significant intellectual contributors to nearly many multi-author publications of which Dr. Saleh is a co-author as an Assistant Professor.

In terms of research funding, Dr. Saleh has shown an ability to secure funding from the most competitive funding agencies (e.g., NIH, NSF, and EPA) as PI and co-PI, with his share ~$1.5M during his time in rank as an Assistant Professor (2009-2016). His most recent two grants from NSF ($119K) and NIH ($173K) as sole PI is a positive trend from the point of view of illustrating Dr. Saleh's ability to secure funds from top agencies to conduct work independently from other senior collaborators. While collaborations are a plus, and in many cases almost required for a successful proposal, establishing an independent track record from senior collaborators is important in consideration for P&T at my institution, and he is showing this ability in the most recent grants he has received. In terms of total funding as PI or co-PI, Dr, Saleh is on par with faculty at other major research universities at a similar career stage who have been tenured and promoted.

As a mentor of graduate students, Dr. Saleh has so far graduated 2 Ph.D. students from UT Austin, and one from University of South Carolina. Three graduated Ph.D. students is above the

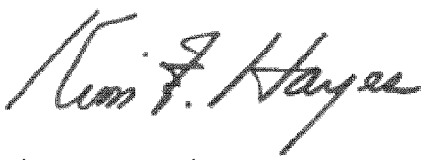
average for candidates I have reviewed for P&T. Each of these students has published at least 4 first author papers and as many as 7, and they all are also co-author on many papers (for total number of publications >10). Both the number of graduates and the paper production of his Ph.D. graduates in the mostly high-quality journals are good indicators of an effective and productive faculty mentor. As an adviser of 2 current Ph.D. and 2 MS students who are poised to become Ph.D. students, along with 3 current MSE students, Dr. Saleh has an excellent pipeline for continuing his strong research program.

4. **What is your perspective on Dr. Saleh's promise for further professional growth and leadership?**

Dr Saleh is well-poised for future professional growth and for enhancing the impact of his research, especially as he moves his fundamentally strong work into application-oriented studies of ENMS in more complex systems and solution conditions. As noted in my previous comments, his scholarly achievements to date have already brought him significant recognition and acclaim, and he has the research program and infrastructure in place to magnify his impact even more in the foreseeable future. Further evidence of Dr. Saleh's potential for leadership also comes from the professional service roles he taken on to date including Chair or Co-chairing multiple symposia at national conferences of American Chemical Society and the Sustainable Nanotechnology Organization of the Royal Society of Chemistry, and his appointment to the Editorial Advisory Board of Environmental Science-Nano, one of the premiere journals in his field of expertise. In particular, his editorial board membership promises to provide him with opportunities to gain even more exposure to his peers and enhance his growing reputation as a leader in his field.

In summary, I view Dr. Saleh's casebook for P&T to be strong in terms of scholarly contributions in research. I see him as an emerging leader in his field. P&T is often considered appropriate for an Assistant Professor who has established a strong body of initial scholarship and shows great promise for future impact and leadership. When I look to the future, I see Dr. Saleh on steeper than average trajectory of fulfilling that promise. As such I have no hesitation in recommending a favorable decision in consideration of Dr. Saleh for tenure and promotion to Associate Professor.

Sincerely,



Kim F. Hayes, Ph.D.
Donald Malloure Department Chair &
Authur J. Decker Collegiate Professor of Civil and Environmental Engineering

From: Kim Hayes
To: Peoples, Hortensia D
Subject: RE: On Behalf of Richard L. Corsi-- Letter of Reference Request for Dr. Navid Saleh
Date: Thursday, July 14, 2016 4:22:27 PM
Attachments: Navid Saleh P&T Scholarship Evaluation 2016.pdf
Hayes Brief Bio May 2016.pdf

My evaluation and brief bio are attached. A link to my full CV is given below.
http://www-personal.umich.edu/~ford/Kim%20Hayes%20CV%20Full.pdf
Regards,

Kim

Kim F. Hayes
Professor and Donald Malloure Department Chair
Arthur J. Decker Collegiate Professor of Civil and Environmental Engineering
Department of Civil and Environmental Engineering
University of Michigan
2340 G.G. Brown Lab, 2350 Hayward Street
Ann Arbor, MI 48109-2125
Voice: (734) 764-8495
FAX: (734) 764-4292
ford@umich.edu

Administrative Assistant:
Rosalind Martin
rpmartin@umich.edu
(734) 764-8495

From: Peoples, Hortensia D [mailto:hpeoples@mail.utexas.edu]
Sent: Monday, July 11, 2016 10:02 PM
To: ford@umich.edu
Subject: RE: On Behalf of Richard L. Corsi-- Letter of Reference Request for Dr. Navid Saleh

Good Evening,
Just a gentle reminder. Thank you very much for assisting us in this process.
Hortensia

From: Peoples, Hortensia D
Sent: Friday, May 27, 2016 10:13 AM
To: ford@umich.edu
Subject: On Behalf of Richard L. Corsi-- Letter of Reference Request for Dr. Navid Saleh
Importance: High

Dr. Hayes:

Professor Hayes received his B.S. and M.S. degrees in 1980 from Stanford University. He remained at Stanford to earn an additional M.S. degree and his Ph.D. in 1982 and 1987, respectively. Following graduation, Professor Hayes completed a post-doctoral fellowship at Stanford in 1988. He joined the University of Michigan faculty as an assistant professor in the Department of Civil and Environmental Engineering (CEE) in 1988. He was promoted to associate professor, with tenure, in 1994 and to professor in 2001. He served as program director of the Environmental and Water Resources Engineering Program in CEE from 2001 to 2007. Professor Hayes was appointed as the interim chair in 2011, chair in 2013 and then as the Donald Malloure Department Chair of Civil and Environmental Engineering in July 2015.

Professor Hayes' research expertise includes surface and interfacial chemistry, environmental chemistry and engineering, green chemistry and sustainable engineering principles, and nanotechnology for the improvement of water quality. His current research primarily focuses on the evaluation and optimization of solid phase reactive materials in water treatment systems for effective removal of water-based environmental contaminants. On-going projects include optimization of reduced iron oxide and sulfide solid phases and solution conditions for effective removal of radionuclides and metals from water; the synthesis, optimization, and application of nanoparticles for water treatment; advanced oxidation processes using Fenton-based catalysts for removal of pharmaceutical and personal care products from water and wastewater; ion exchange resin and chelation systems for treatment of radionuclide impaired wastewater associated with shale gas extraction by hydraulic fracturing; and an integrated assessment of the sustainability of safe drinking water supply using iron-oxide based filtration systems in Bangladesh.

Professor Hayes honors and awards include a National Science Foundation Presidential Young Investigator Award, a University of Michigan Distinguished Faculty Achievement Award, his selection as a CH2MHill Distinguished Lecturer, and an Outstanding Publication Award from the Association of Environmental Engineering and Science Professors (AEESP) for a "Landmark paper (Hayes et al. *Science*, 238, 783-786, 1987) that has withstood the test of time, and significantly influenced the practice of environmental engineering and science." He also received a Distinguished Service Award form AEESP for outstanding service as Board Member and Secretary. In October 2015, Professor Hayes was named the Arthur J. Decker Collegiate Professor of Civil and Environmental Engineering. Professor Hayes has published over 100 journal articles, 11 book chapters, and more than 160 refereed conference proceedings, summaries, and abstracts. He has graduated 18 Ph.D. students and supervised 27 MSE students.

Candidate

VirginiaTech
College of Science

Department of Geosciences
4044 Derring Hall (0420)
Blacksburg, Virginia 24061
540/231-6227 Fax: 540/231-3386
E-mail: hochella@vt.edu
www.geos.vt.edu

July 12, 2016

Prof. Richard L. Corsi
Department of Civil, Architectural & Environmental Engineering
The University of Texas at Austin
Austin, TX 78712

Dear Prof. Goldfarb,

It is a pleasure for me to write this letter of evaluation for Assistant Professor Navid Saleh in your department in the year of his evaluation for promotion and tenure. I have been on the College of Science P&T committee at Virginia Tech over the last three years, and am more familiar with this process (from the inside out) than ever before as a result. And in my particular position at Virginia Tech, I report directly to the University President, and I have also learned a great deal about seeing the entire university as a system that operates with the very best faculty who need to clear a high bar in order to have the privilege to stay on at any top research university. Please understand that I am known at Virginia Tech as being one of the toughest assessors of faculty going up for tenure. I am not afraid to vote "no" in P&T decisions, and I often do just that as I only keep my eyes on the university as a whole, and what is best for it.

Given such an introduction, I can say that this is an easy letter for me to write. I believe that this is a straight-forward case, at least from a research point-of-view. Therefore, this letter will be shorter than nearly all other letters that I write in tenure decisions.

Below, I have organized all of my thoughts based on the four questions that you have offered in your letter to me. I paraphrase these questions below here, with responses that follow each:

1. How do you know Dr. Saleh?

Although I know very well Navid's Ph.D. advisor, Greg Lowry at Carnegie Mellon University, I did not know Navid while he was in Greg's group. Navid ended up as a tenure track hire by the University of South Carolina in 2009, and it was approximately a year later that he introduced himself to me via an e-mail introduction. He wanted to become associated with my group to give himself a stronger base than he found at South Carolina at that time. Greg also told me at that time, when I checked in with him about Navid, that he had been a fabulous and supremely talented and gifted graduate student. With that endorsement, I invited Navid up to Virginia Tech to give a talk and to allow him to get to know our group. Although he visited a few more times over the next few years, and our time together was productive as I tried to help him get started, we never worked directly together or co-authored a paper

together. This was perfectly fine with me. My main interest in him was to help him become a successful professor, and clearly he did. When he got an offer from UT Austin, I was not surprised at all, and although South Carolina was good to him, I was happy to see him join you. I have not seen Navid in the last three years, and we have not been in touch. The only reason is that we both lead very busy lives. Nevertheless, I must admit that I have always marveled at his skills, and I have always admired him.

2. What makes Dr. Saleh's work different and special?

Quite simply, I think what makes Navid's work exceptional is that he is naturally and incredibly bright, and broad. He can see scientific and engineering problems with this breath, and he is gifted enough to understand the problem from just about every angle. This is rare. He is accomplished and versatile in chemistry (thermodynamic and kinetic), materials (including structure analysis), biotoxicity, molecular biology techniques, mathematics, fluid mechanics, the physics of forces, and subtleties at the nanoscale where bulk properties are lost. On top of all this, it has always been clear to me that he is a perfectionist. I think that all this, together, makes him very special, which also helps explain how he can have over 4,000 citations while going up for tenure, which is practically unheard of in any field. Granted, he has a bit over a thousand of these citations by being associated with a few papers while in Greg Lowry's group, but the rest he earned himself. And his h-index is rapidly approaching the mid-20's which is also remarkable, again I think supporting what I am describing above.

3. How does he stand up against others his age at top research universities?

This is a very interesting question, as I am very familiar with many people in his field, or close to his field, people who are nano-materials scientists/engineers in Civil and Environmental Engineering departments across the country and around the world, and in his age group. Many of the people that I know in these positions are also highly accomplished, and many that I know were roughly like him five to eight years ago, and now they are full professors, and very, very successful ones. In my final analysis, from what I see out there, I'd put Navid in the top quarter of the people in his field at top research university. From my view, on the outside looking in, any school that has Navid on their faculty, at least from a research point of view, is fortunate, really fortunate.

4. What is his promise for the future?

Good question, again. Who knows, but I think the range of possibilities goes from, at worst, a super solid and admired contributor with a very special and long career, to at best, the National Academy of Engineering. It will be somewhere in that range, I think guaranteed.

Let me conclude by saying that if Navid was up for tenure in Virginia Tech's Department of Civil and Environmental Engineering at Virginia Tech, as a top-10 graduate department, he would definitely get tenure. If he was at Stanford, another top-10 graduate department, he would also receive tenure. I can say having been at Stanford for 13 years earlier in my career, and at Virginia Tech for the last 24 years of my career.

I hope that you find my letter of use in this case. I attach my short CV and a very short bio narrative.

Thank you very much, and I wish you the best in this important discussion.

Yours sincerely,

Michael F. Hochella, Jr.
University Distinguished Professor
Director, The Virginia Tech National Center for Earth and Environmental Nanotechnology Infrastructure
Fellow of AGU, AAAS, GSA, GS, EAG, MSA, IAGC, RSC
Former President, The Geochemical Society
Past-President, The Mineralogical Society of America

Two attachments

Candidate

From: Michael Hochella
To: Peoples, Hortensia D
Subject: Re: On Behalf of Richard L. Corsi-- Letter of Reference Request for Dr. Navid Saleh
Date: Wednesday, July 13, 2016 12:11:10 PM
Attachments: Navid Saleh.pdf
Hochella_Short CV.doc
Hochella bio (short2).doc

Hello Hortensia,
Here is my letter (attached) for Dr. Saleh, as requested. I have also attached two files related to my bio, also as requested.
All the best,
Mike Hochella

On Jul 11, 2016, at 7:01 PM, Peoples, Hortensia D wrote:

> Good Evening,
> Just a gentle reminder. Thank you very much for assisting us in this process.
> Hortensia
>
> **From:** Peoples, Hortensia D
> **Sent:** Friday, May 27, 2016 9:39 AM
> **To:** hochella@vt.edu
> **Subject:** On Behalf of Richard L. Corsi-- Letter of Reference Request for Dr. Navid Saleh
> **Importance:** High
>
> Dr. Hochella:
>
> The Department of Civil, Architectural and Environmental Engineering at the University of Texas at Austin is considering Dr. Navid Saleh for promotion to Associate Professor. As part of this process, we would appreciate if you would provide your candid assessment of his scholarly contributions. I have attached electronic copies of our formal letter, Dr. Saleh's current CV, and five of his papers. If you would like to receive any other information, or a hard copy of the documents, please let me know.
>
> We would appreciate receiving your letter by *July 15, 2016*. Thank you in advance for your assessment.
>
> With sincere appreciation,
> Richard L. Corsi, Ph.D., P.E.
> Chair & ECH Bantel Professor for Professional Practice
> Member, UT Academy of Distinguished Teachers
> Department of Civil, Architectural & Environmental Engineering
> CAEE website: http://www.caee.utexas.edu/
> CAEE Twitter: @UT_CAEE
> Follow me on Twitter: @CorsIAQ

Michael F. Hochella, Jr.

Virginia Polytechnic Institute and University
University Distinguished Professor

hochella@vt.edu
540.231.6227

Education

- Virginia Tech Geological Sciences B.S., 1975
- Virginia Tech Geological Sciences M.S., 1977
- Stanford University Earth Sciences Ph.D., 1981

Biography

Michael F. Hochella, Jr. is a University Distinguished Professor at Virginia Tech (Blacksburg, Virginia, USA), concentrating in the area of environmental science on local, regional, and global levels. He is one of two "fathers" of nano-geoscience, a brand new field in the Earth sciences that is designed to investigate and understand the fundamental and practical importance of how naturally occurring nano-materials on Earth affect how the world's oceans, atmosphere, soils, rocks, and biological components behave. Beginning especially in the early 1990's, this field was invented by Hochella and Dr. Jill Banfield at the University of California atBerkeley. Hochella is also thought to be one of the finest researchers ever in a field of geochemistry called "mineral surface geochemistry," an important fundamental field of geochemistry in which the critical atomic and molecular interactions between the Earth's minerals and the rest of the planet (water, air, soil, living things) take place.

Hochella received his B.S. and M.S. from Virginia Tech in 1975 and 1977, respectively, and his Ph.D. from Stanford University in 1981. He has been a professor, first at Stanford, and then at Virginia Tech, for a total of 26 years. He has been a Fulbright Scholar, has won the Humboldt Award, the Brindley Lecture Award, the Dana Medal, and the Virginia Scientist of the Year Award. He has been elected as a Fellow of nine international scientific societies/ organizations including the American Association of the Advancement of Science and the American Geophysical Union. He has held the Presidencies of both the Geochemical Society and the Mineralogical Society of America, both international scientific societies. He has also won the Distinguished Service Medal of the Geochemical Society. He has served on high-level advisory boards to the National Science Foundation and the U.S. Department of Energy. He has a total of 201 professional publications, and has been cited over 9,400 times in the professional literature (source: Google Scholar) currently increasing by over 850 new citations per year. He has been hosted for giving lectures and workshops in 43 of the 50 states in the

U.S. and in five Canadian provinces, and he has also been invited to 15 other countries around the world (Europe, Far East, Middle East, and Africa) as an environmental scholar and speaker. He has raised well over $22.5 million in research funding.

Hochella has taught for 33 years at Stanford and Virginia Tech, teaching a total of 10 different courses from introductory freshman classes to advanced classes for Ph.D. students. His average overall teacher rating from students over the years is 3.85 on a 4.00 scale. He has developed brand new courses and also new curricula at the high school, undergraduate and graduate levels. He has also closely advised and mentored over 100 students, each for multiple years, to move them towards the specific careers of their choice. For the graduate students and post-docs for whom he has been the principal advisor, 22 of them are now professors at universities in five countries, while many others hold prominent positions in national laboratories, industry, and scientific publishing.

Professional Employment

- University Distinguished Professor Virginia Tech 2007-permanent
- Professor Virginia Tech 1996-2007
- Associate Professor Virginia Tech 1992-1996
- Associate Professor (Research) Stanford University 1989-1992
- Senior Research Associate Stanford University 1983-1989
- Senior scientist Corning, Inc. 1981-1983

Teaching Interests

My teaching interests are wide ranging, from Earth systems science and sustainability (geo- and bio-aspects), to introductory, mineralogical, environmental, and resource geology, to advanced graduate level courses in my fields of specialty, including nanoscience and technology, mineral surface geochemistry, mineral-microbe interaction, mineralogy, crystallography, bulk and surface atomic structure analysis, and the theory, design, and use of X-ray, electron, ion, and laser-beam spectroscopic, diffraction, and analytic instrumentation.

Research Interests

- Elucidating the role that nanoscience and mineral surface geochemistry/biogeochemistry plays in major aspects of the earth sciences, including especially environmental issues and biogeochemical cycling of the elements.
- Mineral-microbe interactions from both geochemical and biochemical perspectives, applications to nutrients and toxins in the environment and their mobility.

Yale SCHOOL OF ENGINEERING
& APPLIED SCIENCE
Chemical and Environmental Engineering

Candidate
JAEHONG KIM
Professor

PO Box 208286
New Haven CT 06520-8286
T 203.432.4386
F 203.432.4387
jaehong.kim@yale.edu
seas.yale.edu

courier
9 Hillhouse Avenue
New Haven CT 06511

June 1, 2016

Richard L. Corsi, Ph.D., P.E.
Chair & ECH Bantel Professor for Professional Practice Member
Department of Civil, Architectural & Environmental Engineering
The University of Texas at Austin

Dear Professor Corsi:

It is my great pleasure to review and comment on Dr. Navid Saleh's package for promotion to an associate professorship with tenure at the University of Texas at Austin. I know Navid and his work very well. I first met him in one of conferences many years ago and we have been interacting for approximately ten years on various occasions, mostly in professional meetings. I also have been following up on his papers and some of his research has directly influenced my own. Please note that I moved to Yale University from Georgia Institute of Technology in 2013; although Navid did his postdoctoral training at Yale, we did not overlap each other. I have never directly collaborated with Navid and I do not have any conflict of interest.

To start, Navid's record as an assistant professor being considered for tenure promotion is very strong. He has published total 49 papers; among these, 13 papers were published in Environmental Science & Technology, arguably the top journal in our field. He published 7 Environmental Science & Technology papers since he started his own independent career involving his students as co-authors. He also published in other top journals in the field including Nano Letters, Langmuir, and Water Research. His citation record is excellent; according to Google Scholar (accessed on June 1, 2016), his work has been cited 4102 times and his h-index is 23. This is more than most other junior faculty at comparable career stage. What is more impressive is that his work was cited 691 times in year 2015 and the number of citation keeps steadily increasing. He has 11 papers that have been cited more than 100 times; that's even better than my own citation record. His productivity has been well supported by successful securing of external grants; Navid was able to attract funding from competitive funding agencies such as NSF, EPA, and NIH. The fact that he was funded six times by NSF, all as the sole or primary PI, deserves special recognition, since the current success rate in CBET (the program that Navid applies to) is at most 5-6%. He can be easily the very best junior faculty with the most success in securing competitive external funding. Considering all the above factors, I am very confident that he can continue his productive trajectory in years to come.

Yale SCHOOL OF ENGINEERING
& APPLIED SCIENCE
Chemical and Environmental Engineering

Candidate
JAEHONG KIM
Professor

PO Box 208286
New Haven CT 06520-8286
T 203.432.4386
F 203.432.4387
jaehong.kim@yale.edu
seas.yale.edu

courier
9 Hillhouse Avenue
New Haven CT 06511

His research has primarily focused on physical behaviors of nanoparticles, particularly aggregation and deposition onto the surfaces. The tools and approaches that he employs are not considered innovative since the majority of his research utilizes classical tools such as dynamic light scattering and classical theories such as DLVO and particle dynamics. What sets apart David's research is timely identification of subjects that have large impact on the current science, specifically in the area of environmental health and safety of nanomaterials. He has studied how carbon nanotubes, metal oxides and silver nanoparticles behave in the aqueous environment; these topics have been widely investigated by many researchers who often resort to empirical approaches for the interpretation of observations. Navid's research stands out since he performs a very careful analysis of observations based on fundamentals of chemistry and physics as well as in-depth analyses using other state-of-art instrumentation and even molecular dynamics simulations. The questions he has asked are quite intriguing; for example, I would have not supposed that the chirality of carbon nanotube would have such a profound effect on its dispersion status. A very interesting question answered by well-planned fundamental level research. Navid's research style resembles that of Meny Elimelech at Yale (Navid's postdoctoral advisor) and Greg Lowry (Ph.D. advisor), which is great since these two are the two best researchers in the field of physical processes of nanomaterials. Navid is certainly on the track to follow the foot steps of these academic giants.

I am particularly excited with Navid's new research direction where he starts to really differentiate himself from his past advisors. I recently listened to Navid's talk on the subject of irradiation-based disinfection technology where he plans to employ photothermal and upconversion metal oxide particles that function under microwave irradiation. This idea was a part of Navid's CAREER proposal (not funded) as well as INFEWS proposal (under review). It is very difficult to secure funding on the subject that is truly breakthrough, so I imagine it may take some time for Navid to fully establish a strong research program around this topic. However, based on how Navid has presented in his recent talk, I am very positive that he should be able to launch a new research direction that will truly distinguish himself.

I have served in a tenure review committee for college of engineering at Georgia Institute of Technology and reviewed nearly one hundred tenure packages across disciplines. I have also reviewed many tenure cases in the field of environmental engineering over past many years. I can confidently state that Navid shall be easily qualified as a tenured professor in most top-tier universities in the US. I would rate Navid very comparable to Professor John Fortner at Washington University in St. Louis (Ph.D. 2007; total citation = 3440; 2015

Candidate

Yale SCHOOL OF ENGINEERING
& APPLIED SCIENCE
Chemical and Environmental Engineering

JAEHONG KIM
Professor

PO Box 208286
New Haven CT 06520-8286
T 203.432.4386
F 203.432.4387
jaehong.kim@yale.edu
seas.yale.edu

courier
9 Hillhouse Avenue
New Haven CT 06511

citation = 357; h-index = 19) and Professor Mike Dodd at University of Washington (Ph.D. 2008; total citation = 1234; 2015 citation = 184; h-index = 12). Both are in the similar field of environmental engineering as Navid, at similar career stage, and were recently tenured. I have no reason to believe that Navid is less competitive than these two emerging stars in our field. In fact, Navid is one of emerging stars who can be tenured at any research-intensive institutions.

Finally, I would like to also mention Navid's exceptional interpersonal and communication skill. He is already a great member of our society (i.e., environmental scientists and engineers) with visible presence and contributions through, for example, organizing many conference sessions and workshops. As you must be well aware of, Navid is a very dynamic speaker. He talks with great enthusiasm and energy, and his presentation materials are of very high quality; he has been a great ambassador of our field and also your university and the department.

Overall, I strongly recommend without any reservation Dr. Navid Saleh's promotion to associate professor and tenure at University of Texas. Please do not hesitate to contact me for any further information.

Sincerely,

Jaehong Kim
Professor of Chemical and Environmental Engineering

Candidate

From: Kim, Jaehong
To: Peoples, Hortensia D
Subject: Re: On Behalf of Richard L. Corsi-- Letter of Reference Request for Dr. Navid Saleh
Date: Wednesday, June 01, 2016 3:16:14 PM
Attachments: Navid Saleh Review_2016_6_1.pdf
Importance: High

Hi Hortensia,

Attached is my letter. Please confirm the receipt.

Thanks,

Jaehong.

****
Jaehong Kim, Ph.D.
www.yaleseas.com/jaehongkim/

Professor
Department of Chemical and Environmental Engineering
School of Engineering and Applied Science
Yale University

Phone: 203.432.4386
Fax: 203.432.4387
Email: jaehong.kim@yale.edu
Mail: P.O. Box 208286, New Haven, CT 06520
Express Mail: 9 Hillhouse Avenue, Room 301, New Haven, CT 06511

****

On May 26, 2016, at 10:51 PM, Peoples, Hortensia D <hpeoples@mail.utexas.edu> wrote:

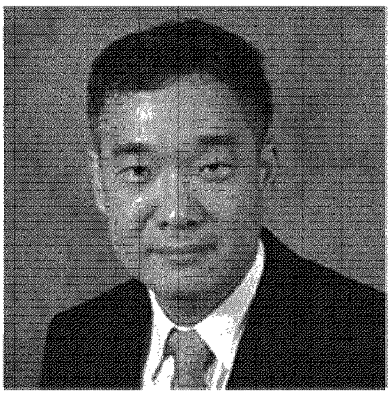
Dr. Kim:

The Department of Civil, Architectural and Environmental Engineering at the University of Texas at Austin is considering Dr. Navid Saleh for promotion to Associate Professor. As part of this process, we would appreciate if you would provide your candid assessment of his scholarly contributions. I have attached electronic copies of our formal letter, Dr. Saleh's current CV, and five of his papers. If you would like to receive any other information, or a hard copy of the documents, please let me know.

We would appreciate receiving your letter by July 15, 2016. Thank you in advance for your assessment.

With sincere appreciation,
Richard L. Corsi, Ph.D., P.E.
Chair & ECH Bantel Professor for Professional Practice
Member, UT Academy of Distinguished Teachers
Department of Civil, Architectural & Environmental Engineering
CAEE website: http://www.caee.utexas.edu/
CAEE Twitter: @UT_CAEE
Follow me on Twitter: @CorsIAQ

Hortensia Peoples | Civil, Architectural and Environmental Engineering
Cockrell School of Engineering
The University of Texas at Austin
301 East Dean Keeton - Stop C1700



Jaehong Kim

Yale University
Professor of Chemical & Environmental Engineering

Phone: (203) 432-4386
Email: jaehong.kim@yale.edu

Degrees

- Ph.D., University of Illinois at Urbana-Champaign
- M.S., Seoul National University
- B.S., Seoul National University

Biography

Jaehong Kim is currently the Professor of Chemical and Environmental Engineering in the School of Engineering and Applied Science at Yale University. Prior to joining Yale University in 2013, he was the Georgia Power Distinguished Professor and the Associate Chair for Undergraduate Programs at the School of Civil and Environmental Engineering at the Georgia Institute of Technology. He received B.S. and M.S. degrees in Chemical and Biological Engineering from Seoul National University in Korea in 1995 and 1997, respectively, and a Ph.D. degree in Environmental Engineering from the University of Illinois at Urbana-Champaign in 2002. He is interested in diverse aspects of environmental science and engineering, from fundamental photocatalytic and photoluminescent materials chemistry to water quality engineering in the developing world. He likes traveling, playing guitar, taking photographs, playing tennis, skiing, and most of all, spending time with his two daughters, Seoyoun and Seorin.

Interests

- Application of nanomaterials for water treatment
- Development of upconversion technology for environmental application
- Photochemical and photothermal disinfection
- Development of self-healing membranes

Awards

2016 Elected Member, Connecticut Academy of Science and Engineering

2015 AEESP Distinguished Service Award, Association of Environmental Engineering and Science Professors

2013 Bill Schultz Junior Faculty Teaching Award, School of CEE, Georgia Tech

2013 Walter L. Huber Civil Engineering Research Prize, American Society of Civil Engineers (ASCE)

2012 Environmental Science & Technology 2011 Top Environmental Technology Paper Award

2010 Environmental Engineering Faculty Award, AEES at Georgia Tech

2010 Bill Shultz Sabbatical Award, School of CEE, Georgia Tech

2009 Paul L. Busch Award, Water Environment Research Foundation (WERF)

2009 Excellence in Review Award, Environmental Science & Technology

2009 Excellence in Research Award, School of CEE, Georgia Tech

2007 CETL/BP Junior Faculty Teaching Excellence Award, Georgia Tech

2007 Excellent Paper Award, Korean Society of Environmental Engineers

2004 Editor's Award, ASCE Journal of Environmental Engineering

2002 Engelbrecht Graduate Fellowship in Environmental Engineering, UIUC

2001 Mavis Memorial Fund Scholarship, College of Engineering, UIUC

1997 Best Paper Presentation Award, Korean Society of Industrial Engineering Chemistry

1994 Alumni Scholarship, Alumni Association of Chemical Technology in SNU

Candidate

STANFORD
CIVIL & ENVIRONMENTAL
ENGINEERING

RICHARD G. LUTHY
Silas H. Palmer Professor
Department of Civil and Environmental Engineering
Director, Engineering Research Center for
Re-inventing the Nation's Urban Water Infrastructure

Yang and Yamazaki Environment
& Energy Building, Room 191
Stanford University
Stanford, CA 94305-4020

June 23, 2016

Prof. Richard L. Corsi, Ph.D., P.E.
Chair & ECH Bantel Professor for Professional Practice
Department of Civil, Architectural & Environmental Engineering
University of Texas at Austin
Austin, TX 78712
Via email corsi@mail.utexas.edu

Re: Promotion of Dr. Navid Saleh

Dear Richard:

This letter is in response for a recommendation for Dr. Navid Saleh, who is being considered for tenure and advancement to the rank of associate professor.

I have known Dr. Saleh for about seven years, since he was appointed at the University of South Carolina. I wrote a detailed letter of recommendation for his application to the University of Texas in January 2013. I was very favorably impressed with his scholarship in 2013 and I remain so today—so please consider this letter a supplement to what I wrote several years ago.

Dr. Saleh's principal line of research is the environmental engineering applications of nano-scale materials, as well as understanding the transport and fate and effects of nano-scale materials in the environment. His research has branched out to include toxicology, pathogen inactivation, and potential health aspects of nanoparticles.

Since arriving at the University of Texas, he has 17 papers published or submitted. His research is first-rate and his publications are presented in the most important journals in our field, particularly *Environmental Science & Technology*, *Water Research*, *Environmental Science: Nano*, and *Langmuir*.

He continues to show a high rate of productivity and impact. His work addresses the aggregation and deposition of nano particles—and a 'safer by design' approach for cost effective nano-technology enabled water treatment technologies. He leads work on environmental health and safety of nanoparticles and was invited to prepare a review article for *Nanomaterials'* special issue on nanotoxicology. His lab work and policy research point to several issues emerging in this field: 1. The shift from single-material processing to nano-hybrid materials, and that multi-functionality is the future of nanomaterial applications, 2. The unique properties of nano-hybrids and risks of nano-hybrid materials are different than the sum of component properties, and 3. That nano-hybrids are materials where the hybridization results in a change of the dimensionality for at least one of the components. These factors drive the environmental and health and safety aspects of research on nano-hybrids. Dr. Saleh is among the foremost thought leaders on these emerging issues. Among

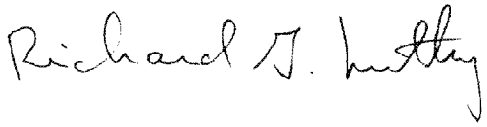
the papers published while at UT, he is key author on several that highlight his standing for guiding discussion on the health and safety of multi-functionality naonmaterials (e.g., UT #3 and UT #7).

Dr. Saleh's laboratory work focuses on the assessment of aggregation, transport/deposition and behavior in complex matrices. His 2016 (UT #6) work on transport of gold nanospheres and single-walled carbon nanotubes shows the role of natural organic matter in particle mobility. Gold nanospheres act as carriers for the carbon nano-tubes, and pre-deposited carbon nano-tubes can enhance the filtration of gold nanospheres. This work and other papers show that depending on antecedent conditions and ionic matrix, engineered nanomaterials may exhibit facilitated transport or enhanced removal. This illustrates the need for study of such mixtures under non-idealized systems.

Dr. Saleh is destined to make lasting contributions and shows excellent promise for the future. One example is his recent work on harnessing microwave radiation by absorption by metal oxide carbon nano-tube heterostructures to produce reactive oxygen species for disinfection. This is a highly original contribution with possibility for wide spread adoption in point-of-use treatment systems.

These examples illustrate Dr. Saleh's innovations and contributions in addressing complexity at the nano-scale and using this understanding to assess the environmental health and safety of new materials, and harnessing that knowledge for new treatment technologies. I believe he compares very favorably with other investigators at this stage at highly-ranked research-intensive universities. Based on his accomplishments to date—both at the University of South Carolina and the University of Texas—Dr. Saleh shows excellent promise for future professional growth and leadership. His research and standing has flourished since moving to UT.

Sincerely



Richard G. Luthy
Professor & Director of the Engineering Research Center for
Re-Inventing the Nation's Urban Water Infrastructure

Candidate

From: Richard G. Luthy
To: Peoples, Hortensia D; Corsi, Richard L
Cc: Richard G. Luthy; Lawler, Desmond F
Subject: Letter of Reference Request for Dr. Navid Saleh
Date: Thursday, June 23, 2016 1:56:15 PM
Attachments: Saleh Navid, U Texas 2016.pdf
ATT00001.htm
Importance: High

Dear Richard and Hortensia:

Attached is my letter of reference for Dr. Navid Saleh.

Best wishes, Dick

Richard G. Luthy
Silas H. Palmer Professor, Department Civil and Environmental Engineering, and
Senior Fellow, Woods Institute for the Environment at Stanford
Director, Engineering Research Center for Re-inventing Urban Water Infrastructure [renuwit.org]
Street address: Room 191, Yang & Yamazaki Environment & Energy Building, 473 Via Ortega
Stanford University, Stanford, California 94305-4020
email: luthy@stanford.edu telephone: 650-721-2615 fax: 650-725-9720
Research Group

RICHARD G. LUTHY, Ph.D., P.E., D.E.E., Fellow WEF
Department of Civil and Environmental Engineering
Stanford University, Stanford, CA 94305-4020

Relevant Research Experience

- Director, NSF ERC for Re-inventing the Nation's Urban Water Infrastructure, ReNUWIt, a consortium of four universities that promote new technologies and systems-level solutions for urban water systems to save resources and increase resiliency, reliability and social acceptance
- 40 years research on physiochemical processes for water quality improvement including application to water reuse & management of persistent and bioaccumulative organic contaminants

Education and Training

Ph.D., Civil Engineering (Environmental Engineering), University of California, Berkeley, CA 1976
MS, Civil Engineering (Environmental Engineering), University of California, Berkeley, CA, 1974
MS, Ocean Engineering, University of Hawai'i, Honolulu, HI, 1969
BS, Chemical Engineering, University of California, Berkeley, CA, 1967
Honorary Sc.D., Environmental Engineering, Clarkson University (2005)

Professional Experience

2000 - Silas H. Palmer Professor of Environmental Engineering, Dept. of Civil and Environmental Engineering, Stanford Univ.; Senior Fellow, Woods Institute for the Environment (2004 -)
2003 - 09 Chair, Department of Civil and Environmental Engineering, Stanford University
1996 - 99 Thomas Lord Professor of Environmental Engineering, Carnegie Mellon University
1986 - 88 Associate Dean, Carnegie Institute of Technology, Acting Dean (6/1988-12/1988)
1975 - 99 Asst/Assoc/Prof., Dept. of Civil & Env. Eng., Carnegie Mellon Univ. (Dept. Head 1989-96)
Professional Engineer (Pennsylvania, License PE-24546E, expires 9/30/2017)

Selected Awards, Recognitions and Professional Service

Gordon Maskew Fair Award, American Academy of Environmental Engineers and Scientists (2015)
External Review Committee, Dept. of Civil and Env. Eng., Univ. of California, Berkeley (2014)
Chair, NRC Committee on Beneficial Use of Graywater and Stormwater (2013 - 15)
Peer Committee, Civil Engineering, Vice Chair and Chair, National Academy of Engineering (2013-16)
Fellow, Water Environment Federation (2013)
Academy of Distinguished Alumni, Dept. of Civil & Env. Eng., Univ. of California, Berkeley (2012)
AEESP Distinguished Lecturer (2011-2012)
Chair/Member, AEESP Foundation Board (2009-2011)
Chair, Peer Review, Swiss Federal Institute of Aquatic Science and Technology (2009)
Chair, Review Panel, Helmholtz Program on Sustainable Water Resources Management, Leipzig (2009)
UC Berkeley, CEE Advisory Council (2007-2011)
Einstein Chair Professor, Chinese Academy of Sciences (2005)
National Research Council, Committee on Sediment Dredging at Superfund Megasites (2005-2007)
Chair Professor, Dept. of Environ. Sci. and Eng., Tsinghua University, Beijing, China (2004-2007)
Board Member, Water Environment Research Foundation (2003-2006)
Highly Cited Researcher, ISI (2003)
Lifetime National Associate of the National Academies, NAS, First Class of National Associates (2001)
Jack Edward McKee Medal, Water Environment Federation (2000)
National Science Foundation, Advisory Comm. for Environmental Res. and Education (2000-2003)
National Research Council, Chair, Committee on Bioavailability of Contaminants (2000-2002)
Association of Environmental Engineering and Science Professors, Service Award (1999)
Member, National Academy of Engineering (elected 1999)
Cleanup Project of the Year, US Dept of Defense, Strategic Environ. Res. and Dev. Program (1999)
National Research Council, Member, Vice Chair, Chair, Water Science and Technology Board (1997-2004)
National Research Council, Committee on Intrinsic Remediation (1997-1999)
School of Engineering Advisory Council, Stanford University, Stanford, CA (1997-1999)

Shimizu Corporation Visiting Professor, Dept. of Civil Eng., Stanford University, (1996-1997)
Pennsylvania Water Environment Association, Professional Research Award (1996)
National Research Council, Committee on Innovative Remediation Technologies (1994-1997)
Chair, Gordon Research Conference on Environmental Sciences: Water (1994)
Founders Award, USA National Committee, International Association on Water Quality (1986, 1993)
Editorial Advisory Board, Environmental Science and Technology (1992-1994)
Vice President/President, Association of Environmental Engineering & Science Professors (1986-1988)
Ph.D. Thesis Awards, Assn. of Environ. Engineering and Sci. Professors (1978, 1982, 1988, 2005)
Harrison Prescott Eddy Medal, Water Pollution Control Federation (1980)

Representative Recent Publications Relevant to ReNUWIt and INFEWS

Dr. Luthy has contributed to authorship of more than 250 peer-reviewed research publications and many more presentations at technical conferences, research symposia and workshops.

LeFevre, G. H., Portmann, A. C., Müller, C. E., Sattely, E. S., & Luthy, R. G., Plant Assimilation Kinetics and Metabolism of 2-Mercaptobenzothiazole Tire Rubber Vulcanizers by Arabidopsis. *Environmental science & technology*. 2016 DOI: 10.1021/acs.est.5b04716

Luthy, R. G., Sedlak, D. L., Plumlee, M. H., Austin, D., & Resh, V. H., Wastewater-effluent-dominated streams as ecosystem-management tools in a drier climate. *Frontiers in Ecology and the Environment, 13*(9), 477-485. DOI: 10.1890/150038

Müller, C. E., LeFevre, G. H., Timofte, A. E., Hussain, F. A., Sattely, E. S., & Luthy, R. G., Competing mechanisms for perfluoroalkyl-acid accumulation in plants revealed using an Arabidopsis model system. *Environmental Toxicology and Chemistry*. 2016, DOI: 10.1002/etc.3251

LeFevre, G. H., Müller, C. E., Li, R. J., Luthy, R. G., & Sattely, E. S., Rapid phytotransformation of benzotriazole generates synthetic tryptophan and auxin analogs in Arabidopsis. *Environmental science & technology*, *49*(18), 2015, 10959-10968. DOI: 10.1021/acs.est.5b02749

Luthy, R. G., & Sedlak, D. L., Urban Water-Supply Reinvention. *Dædalus*, 2015, *144*(3), 72-82. DOI: 10.1162/DAED_a_00343

Ismail, N.S., Dodd, H., Sassoubre, L.M., Horne, A.J., Boehm, A.B., Luthy, R.G., "Improvement of Urban Lake Water Quality by Removal of *Escherichia coli* through the Action of the Bivalve *Anodonta californiensis, Environmental Science & Technology* 2015 *49* (3) pp 1664-1672, DOI:10.1021/es5033212

Ismail, N.S., Müller, C.E., Morgan, R.R., Luthy, R.G., Uptake of Contaminants of Emerging Concern by the Bivalves *Anodonta californiensis* and *Corbicula fluminea, Environmental Science & Technology* 2015 *48* (16) pp 9211-9219, DOI:10.1021/es5011576

Hering, J. G., Waite, T. D., Luthy, R. G., Drewes, J. E, Sedlak, D. L., "A Changing Framework for Urban Water Systems," *Environmental Science & Technology*, Cover Feature Article, 2013, 47 10721-10726 DOI:10.1021/es4007096

Halaburka, B. J., Lawrence, Justin E., Bischel, H. N., Hsiao, J., Plumlee, M. H., Resh, V. H., Luthy, R. G.; "Economic and Ecological Costs and Benefits of Streamflow Augmentation Using Recycled Water in a California Coastal Stream. *Environ. Sci. & Technol.*, 2013: 47, 10735-43; DOI:10.1021/es305011z

Bischel, H. N., Simon, G. L., Frisby, T. M., Luthy, R. G. Luthy, "Management Experiences and Trends for Water Reuse Implementation in Northern California," *Environmental Science & Technology*, 2012, 46 180-188, DOI: 10.1021/es202725e

Examples of the Broader Impacts of Professional and Scholarly Activities. Dr. Luthy is a member of the National Academy of Engineering (elected 1999). He is a former Chair of the NRC's Water Science and Technology Board, a past member of the Board of the Water Environment Research Foundation, and a past president of the Association of Environmental Engineering and Science Professors. His research is advancing scientific and regulatory views on water reuse, and environmental risk and management of persistent and bioaccumulative contaminants. He regularly serves on Academic Visiting/External Review Committees.

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Budget Council

Department of Civil and Environmental Engineering
1114 Newmark Civil Engineering Laboratory, MC-250
205 North Mathews Avenue
Urbana, IL 61801-2352

July 18, 2016

Professor Richard Corsi
Chair and ECH Bantel Professor for Professional Practice
Department of Civil, Architectural and Environmental Engineering
The University of Texas at Austin
301 E. Dean Keaton St
Austin, TX 78712-1056

Dear Rich,

I glad to have this opportunity to provide an external letter of evaluation for Dr. Navid Saleh's case under consideration for his promotion to the rank of Associate Professor with Tenure. I have known and followed Dr. Saleh's academic development for approximately the past five years through reading some of his publications, attending his presentations at meetings, and interacting with him in various professional settings. I would like to start by stating that I think highly of Dr. Saleh. He is among a selected group of relatively junior colleagues (perhaps the second wave; the first wave are now associate or early full professor) pioneering the relatively broad field of environmental nanotechnology. I am impressed with the quality of Dr. Saleh's research. It is particularly impressive that with his civil and environmental engineering background he has been able to contribute meaningfully on the important topic of environmental and public health impact of nanoparticles. This observation is supported by his peers in that field of expertise having awarded him a competitive NIH grant, and recommending his papers for publication in highly recognized journals. Dr. Saleh has transitioned well from the University of South Carolina with limited resources to a top research/academic program such as that at UTA. He has been successful in attracting funding and with it he has built a significant research group. He is publishing with his students and collaborators in highly recognized journals including *Environmental Science and Technology and Water Research* and well as several emerging prestigious journals in the new field of nanotechnology. I do not do research on the synthesis of materials with carbon nanotubes and hybrid nanostructures and so I am hoping that other evaluators will be able to provide additional input on Dr. Saleh's research papers in these topics. In summary, I would like to provide a strong recommendation for a positive consideration of the evaluation of Dr. Navid Saleh for promotion to the rank of Associate Professor with tenure. Based on my experience in the CEE P&T process, in the past as member/chair of P&T and ad-hoc committees and more recently as department head, I believe that Dr. Saleh would be successfully promoted if we were evaluating him at Illinois. I hope that you find my comments helpful for your evaluation and decision. Please do not hesitate to contact me if I could be of further assistance.

Sincerely,

Benito J. Mariñas, Ph.D.
Ivan Racheff Endowed Professor and Department Head

BJM:rp

From: Marinas, Benito Jose
To: Peoples, Hortensia D
Subject: RE: On Behalf of Richard L. Corsi-- Letter of Reference Request for Dr. Navid Saleh
Date: Monday, July 18, 2016 2:56:18 PM
Attachments: Navid-Saleh-UTAustin-promotion-letter-from-marinas-2016.pdf

Dear Hortensia,
The evaluation letter for Dr. Saleh is attached. Please let me know if you would need anything else from me.
Thanks,
Benito

From: Peoples, Hortensia D [mailto:hpeoples@mail.utexas.edu]
Sent: Monday, July 11, 2016 9:03 PM
To: Marinas, Benito Jose <marinas@illinois.edu>
Subject: RE: On Behalf of Richard L. Corsi-- Letter of Reference Request for Dr. Navid Saleh

Good Evening,
Just a gentle reminder. Thank you very much for assisting us in this process.
Hortensia

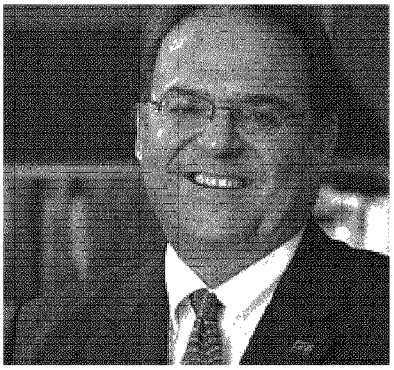
From: Peoples, Hortensia D
Sent: Friday, May 27, 2016 10:31 AM
To: marinas@illinois.edu
Subject: On Behalf of Richard L. Corsi-- Letter of Reference Request for Dr. Navid Saleh
Importance: High

Dr. Mariñas:

The Department of Civil, Architectural and Environmental Engineering at the University of Texas at Austin is considering Dr. Navid Saleh for promotion to Associate Professor. As part of this process, we would appreciate if you would provide your candid assessment of his scholarly contributions. I have attached electronic copies of our formal letter, Dr. Saleh's current CV, and five of his papers. If you would like to receive any other information, or a hard copy of the documents, please let me know.

We would appreciate receiving your letter by *July 15, 2016*. Thank you in advance for your assessment.

With sincere appreciation,
Richard L. Corsi, Ph.D., P.E.
Chair & ECH Bantel Professor for Professional Practice
Member, UT Academy of Distinguished Teachers
Department of Civil, Architectural & Environmental Engineering



Benito J. Mariñas

University of Illinois at Urbana-Champaign

Department Head

Department of Civil and Environmental Engineering

(217) 333-6961

marinas@illinois.edu

Education

- Ph.D. Sanitary and Environmental Engineering, University of California at Berkeley, 1988
- M.S. Sanitary and Environmental Engineering, University of California at Berkeley, 1984
- B.S. Civil Engineering, Universidad Politecnica de Madrid, Spain, 1981

Biography

Benito J. Mariñas holds a B.S. degree (Universidad Politecnica de Madrid, Spain 1982) in civil engineering, and M.S. (University of California at Berkeley 1985), Ph.D. (University of California at Berkeley 1989) degrees in sanitary and environmental engineering. He has been on the faculty of the department of Civil and Environmental Engineering at the University of Illinois since 1995 and has been an Arthur and Virginia Nauman Faculty Scholar since 1998. Prior to coming to the University of Illinois, Dr. Mariñas was a faculty member (1989-1995) at the School of Civil Engineering of Purdue University, West Lafayette, Ind.

Dr. Mariñas has taught graduate and undergraduate courses covering various fundamental, laboratory experimentation and design aspects of environmental engineering and science with particular emphasis in physico-chemical treatment processes for water quality control.

He is a member of the American Chemical Society, American Society of Civil Engineers, American Water Works Association, Association of Environmental Engineering and Science

Professors, International Water Association, and Water Environment Federation. He has served these societies through participation in several committees.

Dr. Mariñas has been the recipient of several prestigious awards including the Harold Munson Outstanding Teacher Award (1992), and Ross Judson Buck '07 Outstanding Counselor Award (1992) from the School of Civil Engineering at Purdue University, and the Arthur and Virginia Nauman Faculty Scholar Award (1998-present) from the Department of Civil and Environmental Engineering at the University of Illinois at Urbana-Champaign. He is also been included in the University of Illinois Incomplete List of Outstanding Instructors in 1996 and 1997.

Research Statement

Dr. Mariñas has research interests in various mechanistic aspects of chemical and ultraviolet light disinfection processes and membrane technologies for the particular application of controlling waterborne pathogens. He is currently a member of the Center for Zoonoses Research at the University of Illinois. He is also developing hybrid adsorption/membrane processes for the control of pesticides, taste-and-odor-causing compounds and other water contaminants, and working on research projects aimed at elucidating the mechanisms responsible for the formation of disinfection by-products of health concern in drinking water.

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ENVIRONMENTAL ENGINEERING PROGRAM
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING
657 DAVIS HALL #1710
BERKELEY, CALIFORNIA 94720-1710

PHONE: (510) 643-0256
FAX (510) 642-7483

July 16, 2016

Professor Richard L. Corsi
Chair & ECH Bantel Professor for Professional Practice
Department of Civil, Architectural & Environmental Engineering
University of Texas
Austin, TX 78712

Re: Evaluation of Dr. Navid Saleh

Dear Professor Corsi:

I am writing in response to your request to provide an evaluation of Dr. Navid Saleh, who is being considered for appointment to the rank of Associate Professor in your department. I have been aware of Dr. Saleh's research since he was a postdoctoral researcher at Yale and have seen him present his work on several occasions. As my area of research is not closely related to that of Dr. Saleh, I have not had the opportunity to collaborate with him.

Dr. Saleh's research addresses the fate and transport of engineered nanoparticles. Through his doctoral research on the transport of iron nanoparticles in groundwater and continuing on through his postdoctoral post-doctoral research on the aggregation of carbon nanotubes, Saleh developed the skills needed to apply classical treatments of colloid chemistry (e.g., DLVO theory) to explain the behavior of nanomaterials in groundwater and soil. His doctoral research on the effect of different coatings on the mobility of iron nanoparticles (e.g., GP-9 in CV) was very influential to engineers developing approaches for injected iron nanoparticles into aquifers for groundwater remediation. Similarly, his postdoctoral research on the aggregation of multi-walled nanotubes (GP-10) provided an important new perspective on the factors affecting the ways in which carbonaceous nanomaterials were likely to behave in the environment.

After his appointment at the University of South Carolina and his later move to the University of Texas, Saleh continued to apply this fundamental approach and experimental techniques to gain insight into the behavior of engineered nanomaterials. In particular, he extended his post-doctoral research by studying the fate of single-walled nanotubes in the environment. By applying state-of-the-art methods and theoretical models developed in his earlier research, Saleh was able to explain the differences in aggregation behavior of two different forms of single-walled nanotubes (SC-16). His observation that nanotube shape leads to differences in aggregation kinetics of single-walled nanotubes with different chirality is relevant to efforts to interpret experimental data and to predict the environmental fate of materials that may be designed in the future.

Saleh also employed his experimental approach to binary systems in which a second type of nanoparticle or polymer alters the behavior of a nanomaterial that could pose a health or environmental risk. This effort to understand the problem of heteroaggregation is quite relevant to efforts to assess the fate of nanomaterials under conditions that are likely to be encountered in the environment or in wastewater treatment systems. By creating an experimental system that can be used to probe these interactions and applying a rigorous theoretical model, Saleh has

offered the community a means of making his kind of assessment (SC-15). Saleh has also employed this kind of analysis to assess the migration of nanomaterials in porous media (UT-14). This recent effort is a logical follow-up to Saleh's more fundamental heteroaggregation studies and shows good potential for bringing his earlier efforts into practice.

Throughout his career, Saleh has demonstrated an ability to collaborate with researchers in related disciplines, such as environmental toxicology and chemistry. Saleh has contributed new insights into the role of aggregation and surface structure in experiments conducted in complex systems that contain nanomaterials. In my opinion, Saleh has strengthened the research of his collaborators by bringing knowledge of the role of colloid chemistry and surface science to projects that often fail to capture the complex and sometimes subtle impacts of nanomaterial surface processes. For example, the study of the effect of ionic strength on the toxicity of silver, led by his University of Texas colleague, Mary Jo Kirisits (SC-23), is an excellent example of Saleh's ability to provide chemists and toxicologists with insights into the importance of aggregation and surface structure on the effects of nanomaterials.

Since his appointment as an Assistant Professor at the University of South Carolina, Dr. Saleh has been very productive. Excluding papers derived from his postdoctoral research, he has been the corresponding author on approximately 20 papers over the past seven years. He also was a co-author on approximately 15 more papers. Over half of Saleh's papers were published in the most prestigious journal in the field (*Environmental Science & Technology*). The remainder appeared in journals that are well respected with more specialized research domains. Relative to his peers (i.e., Assistant Professors in environmental engineering) this is a very strong publication record. The only possible deficiency in his record relative to the very top members of his cohort is the absence of significant young investigator awards (e.g., NSF CAREER), best paper awards or high-profile keynote talks.

Saleh has also been active within the field, co-chairing sessions at national meetings and giving numerous invited seminars at top-ranked schools. These activities have increased his visibility in the field. Coupled with his strong publication record, Saleh is recognized as one of the leading young researchers studying the fate of nanomaterials in the environment.

Saleh's career development is on a good trajectory. Since his appointment as an Assistant Professor he has continued to develop the techniques and approaches that he used as a graduate student and a post-doctoral researcher. By gradually expanding his toolkit and seeking collaborations with toxicologists and chemists, he has established himself as the researcher who can provide the deepest insights into nanomaterial aggregation. Now that these approaches are established and the important, initial contributions have been made, it will be important for Saleh to develop new research areas. In particular, it would be prudent for him to develop expertise in areas other than nanomaterial fate and colloid aggregation. In his research vision statement, he mentions the use of microwaves and nanomaterials for water disinfection, but he has yet to show much progress in this area. His ability to develop new research areas and to transition away from the areas that he has already established will be key to his continued growth as a scholar and his ultimate reputation as a leader.

In summary, Dr. Navid Saleh has established a strong reputation as one of the leading young researher studying the aggregation and transport of environmental nanomaterials. He has extended the research tools developed prior to his appointment and applied them to several important problems. These contributions are appreciated by the community as evidenced by his numerous collaborations with investigators from related disciplines. Saleh plans to continue to contribute to understanding of nanomaterial fate and to branch out into new areas. If he continues

on the trajectory that he has followed, he has the potential to become one of the leaders of his field. I strongly support his promotion to the rank of Associate Professor with tenure.

Sincerely,

David L. Sedlak
P. Malozemoff Chair Professor

From: David Sedlak
To: Peoples, Hortensia D
Subject: Re: On Behalf of Richard L. Corsi-- Letter of Reference Request for Dr. Navid Saleh
Date: Saturday, July 16, 2016 4:50:12 PM
Attachments: SalehTenure.pdf
ATT00001.htm
DLSCV16_3page.doc
ATT00002.htm

Hortensia:

Here is my letter for the Saleh case and ashort CV. Thanks for your patience and understanding.

David

DAVID L. SEDLAK

EDUCATION

University of Wisconsin, Madison, Wisconsin	Ph.D.
Water Chemistry	June 1992
Cornell University, Ithaca, New York	B.S.
Environmental Science	June 1986

EXPERIENCE

October 1994-Present: **Molezemoff Chair Professor (2013-present), Professor (2004-2013), Associate Professor (2000-2004) and Assistant Professor (1994-2000),** Department of Civil and Environmental Engineering, University of California, Berkeley

April 1992-June 1994: **Postdoctoral Fellow**, Swiss Federal Institute for Environmental Science and Technology, Dübendorf, Switzerland

MAJOR AWARDS

US National Academy of Engineering Elected Member, 2016
Francqui Foundation Chair, Ghent University, 2015
Rydell Distinguished Visiting Professor, Gustavus Adolphus College, 2014
Athalie Richardson Irvine Clarke Prize for Excellence in Water Research, 2014
US National Academy of Engineering Gilbreth Lecturer, 2010
Fulbright Alumni Initiative Award, 2010
Fulbright Senior Scholar Award for Australia, 2003
Paul L. Busch Award for Innovation in Applied Water Quality Research, 2003
National Science Foundation CAREER Development Award, 1998

PROFESSIONAL AFFILIATIONS AND SERVICE (PARTIAL LIST)

Chair, Gordon Research Conference Environmental Sciences Water, 2004 & 2012
Co-Director, Berkeley Water Center, 2010-present
Deputy Director, ReNUWIt NSF Engineering Research Center, 2011-present
Editor-in-Chief, *Environmental Science & Technology*, 2015-present
Member, US EPA Science Advisory Board, Drinking Water Committee, 2002-2009
Member, US National Research Council Research Committee on Water Reuse, 2008-2012
Member, Potable Reuse Expert Panel for California Department of Public Health, 2014-

PUBLICATIONS (PARTIAL LIST)

Sun B, Ma J. and Sedlak D.L. (2016) Chemisorption of perfluorooctanoic acid on powdered activated carbon initiated by persulfate in aqueous solution. *Environ. Sci. Technol.* In press.

Harding-Marjanovic K.C., Houtz E.F., Yi S., Jennifer A. Field J.A., Sedlak D.L. and Alvarez-Cohen, L. (2015) Aerobic biotransformation of fluorotelomer thioether amido sulfonate (Lodyne) in AFFF-amended microcosms. *Environ. Sci. Technol.* 49: 7666-7674.

Harris-Lovett S.R., Binz C., Sedlak D.L., Kiparsky M. and Truffer B. (2015) Beyond user acceptance: a legitimacy framework for potable water reuse in California. *Environ. Sci. Technol.* 49: 7552-7561.

Barazesh J.M., Hennebel T., Jasper J.T. and Sedlak D.L. (2105) Modular advanced oxidation process enabled by cathodic hydrogen peroxide production. *Environ. Sci. Technol.* 49: 7391-7399.

Jasper J.T., Jones Z.L., Sharp, J.O. and Sedlak D.L. (2014) Nitrate removal in shallow, open-water treatment wetlands. *Environ. Sci. Technol* 48: 11512-11520.

Liu H.Z., Bruton T.A., Doyle F.M. and Sedlak D.L. (2014) In situ chemical oxidation of contaminated groundwater by persulfate: decomposition by Fe(III)- and Mn(IV)-containing oxides and aquifer materials. *Environ. Sci. Technol* 48: 10330-10336.

McGuire M.E., Schaefer C., Richards T., Backe W.J., Field J.A., Houtz E., Sedlak D.L., Guelfo J.L., Wunsch A. and Higgins C.P. (2014) Evidence of remediation-induced alteration of subsurface poly- and perfluoroalkyl substance distribution at a former firefighter training area. *Environ. Sci. Technol* 48: 6644-6652.

Jasper J.T., Jones Z.L., Sharp J.O. and Sedlak D.L. (2014) Biotransformation of trace organic contaminants in open-water unit process treatment wetlands. *Environ. Sci. Technol* 48: 5136-5144.

Houtz E.F., Higgins C.P., Field J.A. and Sedlak D.L. (2013) AFFF-derived perfluoroalkyl precursors in contaminated groundwater and soil. *Environ. Sci. Technol.* 46: 9342-9349.

Houtz E.F. and Sedlak D.L. (2012) Oxidative conversion as a means of detecting precursors to perfluoroalkyl acids in urban runoff. *Environ. Sci. Technol* 46(17): 9342-9349.

Pham A.L.T., Doyle F.M. and Sedlak D.L (2012) Kinetics and efficiency of H_2O_2 activation by iron-containing minerals and aquifer materials. *Water Research* 46: 6454-6462.

Pham A.L.T., Doyle F.M. and Sedlak D.L. (2012) Dissolution of mesoporous silica supports in aqueous solutions: Implications for mesoporous silica-based water treatment processes. *Applied Catalysis B: Environmental* 126: 258-264.

Pham A.L.T., Doyle F.M. and Sedlak D.L. (2012) Inhibitory effect of dissolved silica on H_2O_2 decomposition by Iron(III) and Manganese(IV) oxides: implications for H_2O_2-based in situ chemical oxidation. *Environ. Sci. Technol* 46(2): 1055-1062.

Pham A.L.T., Lee C., Doyle F.M. and Sedlak D.L. (2009) A silica-supported iron oxide catalyst capable of activating hydrogen peroxide at neutral pH. *Environ. Sci. Technol* 43(23): 8930-8935.

Lee C. and D. L. Sedlak (2009) A novel homogeneous Fenton-like system with Fe(III)-phosphotungstate for oxidation of organic compounds at neutral pH values. *J. Molec. Catal. A*, 311(1-2): 1-6.

Keenan C.R., Goth-Goldstein R., Lucas D. and Sedlak D.L. (2009) Oxidative stress induced by zero-valent iron nanoparticles and Fe(II) in human bronchial epithelial cells. *Environ. Sci. Technol* 43(12): 4555-4560

Lee C., Keenan C.R. and Sedlak D.L. (2008) Polyoxometalate-enhanced oxidation of organic compounds by nanoparticulate zero-valent iron and ferrous ion in the presence of oxygen. *Environ. Sci. Technol* 42(13): 4921-4926.

Lee C., Kim J.Y., Lee W.I., Nelson K.L., Yoon J. and Sedlak D.L. (2008) Bactericidal effect of zero-valent iron nanoparticles on *Escherichia coli*. *Environ. Sci. Technol* 42(13): 4927-4933.

Keenan C.R. and Sedlak D.L. (2008) Factors affecting the yield of oxidants from the reaction of nanoparticulate zero-valent iron and oxygen. *Environ. Sci. Technol* 42: 1262-1267.

Joo S.H., Feitz A.J., Sedlak D.L. and Waite T.D. (2005) Quantification of the oxidizing capacity of nanoparticulate zero-valent iron. *Environ. Sci. Technol.*, 39, 1263-1268.

Sedlak D.L. and Hoigné J. (1994) The oxidation of S(IV) in atmospheric waters by photo-oxidants and iron in the presence of copper. *Environ. Sci. Technol.* 28(11), 1898-1906.

Sedlak D.L. and Hoigné J. (1993) The role of copper and oxalate in the redox cycling of iron in atmospheric waters. *Atmospheric Environment* 27A(14), 2173-2185.

Sedlak D.L. and Andren A.W. (1991) Aqueous-phase oxidation of polychlorinated biphenyls with hydroxyl radicals. *Environ. Sci. Technol.* 25(8), 1419-1427.

Sedlak D.L. and Andren A.W. (1991) Oxidation of chlorobenzene with Fenton's reagent. *Environ. Sci. Technol.* 25(4), 777-782.